BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In re: Petition for rate increase by Progress Energy Florida, Inc.

Docket No. 050078
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**DIRECT TESTIMONY OF**
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**ON BEHALF OF PROGRESS ENERGY FLORIDA**

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# DIRECT TESTIMONY OF
# JAMES H. VANDER WEIDE, PH.D.

## I. Introduction and Summary.

**Q. Please state your name, title, and business address for the record.**

A. My name is James H. Vander Weide. I am Research Professor of Finance and Economics at the Fuqua School of Business of Duke University. I am also President of Financial Strategy Associates, a firm that provides strategic and financial consulting services to business clients. My business address is 3606 Stoneybrook Drive, Durham, North Carolina.

**Q. Would you please describe your educational background and prior academic experience?**

A. I graduated from Cornell University in 1966 with a Bachelor's Degree in Economics. I then attended Northwestern University where I earned a Ph.D. in Finance. In January 1972, I joined the faculty of the School of Business at Duke University and was named Assistant Professor, Associate Professor, and then Professor.

Since joining the faculty I have taught courses in corporate finance, investment management, and management of financial institutions. I have taught a graduate seminar on the theory of public utility pricing and lectured in executive development seminars on the cost of capital, financial analysis, capital

budgeting, mergers and acquisitions, cash management, short-run financial planning, and competitive strategy. I have also served as Program Director of executive education programs at the Fuqua School of Business, including the Duke Advanced Management Program, the Duke Executive Program in Telecommunications, the Duke Competitive Strategies in Telecommunications Program, and the Duke Program for Manager Development for managers from the former Soviet Union.

I have conducted seminars and training sessions on financial analysis, financial strategy, cost of capital, cash management, depreciation policies, and short-run financial planning for a wide variety of U.S. and international companies, including ABB, Allstate, Ameritech, AT&T, Bell Atlantic, BellSouth, Carolina Power & Light, Contel, Fisons, Glaxo Wellcome, GTE, Lafarge, MidAmerican Energy, New Century Energies, Norfolk Southern, Pacific Bell Telephone, Progress Energy, Inc, The Rank Group, Siemens, Southern New England Telephone, TRW, and Wolseley Plc.

In addition to my teaching and executive education activities, I have written research papers on such topics as portfolio management, the cost of capital, capital budgeting, the effect of regulation on the performance of public utilities, the economics of universal service requirements, and cash management. My articles have been published in *American Economic Review, Financial Management, International Journal of Industrial Organization, Journal of Finance, Journal of Financial and Quantitative Analysis, Journal of Bank Research, Journal of Accounting Research, Journal of Cash Management,*

*Management Science, The Journal of Portfolio Management, Atlantic Economic Journal, Journal of Economics and Business, and Computers and Operations Research*. I have written a book titled *Managing Corporate Liquidity: an Introduction to Working Capital Management*, and a chapter for *The Handbook of Modern Finance*, "Financial Management in the Short Run."

**Q. Have you previously testified on financial or economic issues?**

A. Yes. As an expert on financial and economic theory, I have testified on the cost of capital, competition, risk, incentive regulation, forward-looking economic cost, economic pricing guidelines, depreciation, accounting, valuation, and other financial and economic issues in more than 350 cases before the U.S. Congress, the Canadian Radio-Television and Telecommunications Commission, the Federal Communications Commission, the National Telecommunications and Information Administration, the Federal Energy Regulatory Commission, the public service commissions of 40 states, the insurance commissions of five states, the Iowa State Board of Tax Review, the North Carolina Property Tax Commission, and the National Association of Securities Dealers. In addition, I have testified as an expert witness in proceedings before the U.S. District Court, District of Nebraska; U.S. District Court, Eastern District of North Carolina; Superior Court, North Carolina; the U.S. Bankruptcy Court, Southern District of West Virginia; and the U. S. District Court for the Eastern District of Michigan.

**Q. What is the purpose of your testimony?**

A. I have been asked by Florida Power Corporation d/b/a Progress Energy Florida (PEF) to prepare an independent appraisal of PEF's cost of equity, and to recommend a rate of return on equity that is fair, that allows PEF to attract capital on reasonable terms, and that allows PEF to maintain its financial integrity.

**Q. How did you estimate PEF's cost of equity?**

A. I estimated PEF's cost of equity in two steps. First, I applied several standard cost of equity methods to market data for proxy groups of comparable companies. Second, I adjusted the average cost of equity for my proxy groups for the difference in the perceived financial risk of my proxy companies in the marketplace and the financial risk implied by my recommended capital structure for PEF.

**Q. Why did you apply your cost of equity methods to proxy groups of comparable companies rather than solely to PEF?**

A. I applied my cost of equity methods to proxy groups of comparable companies because my methods require that a company's stock be publicly traded, and PEF does not meet this criteria. In addition, standard cost of equity methodologies such as the discounted cash flow (DCF), risk premium, and Capital Asset Pricing Model (CAPM) require inputs of quantities that are not easily measured. Since these inputs can only be estimated, there is naturally some degree of uncertainty surrounding the estimate of the cost of equity for each company.

However, the uncertainty in the estimate of the cost of equity for an individual company can be greatly reduced by applying cost of equity methodologies to a reasonably large sample of comparable companies. Intuitively, unusually high estimates for some individual companies are offset by unusually low estimates for other individual companies. Thus, financial economists invariably apply cost of equity methodologies to a group of comparable companies. In utility regulation, the practice of using a group of comparable companies is further supported by the regulatory standard that the utility should be allowed to earn a return on its investment that is commensurate with returns being earned on other investments of the same risk.[1]

**Q. What average cost of equity did you find for your proxy companies?**

A. On the basis of my studies, I find that the average cost of equity for my proxy companies is equal to 11.4 percent. This conclusion is based on my application of three standard cost of equity estimation techniques: (1) the discounted cash flow model; (2) the risk premium approach; and (3) the capital asset pricing model.

**Q. Does the average cost of equity of your proxy companies depend on their average capital structure?**

[1] See *Bluefield Water Works and Improvement Co. v. Public Service Comm'n.* 262 U.S. 679, 692 (1923) and *Federal Power Comm'n v. Hope Natural Gas Co.*, 320 U.S. 591, 603 (1944).

A. Yes. The cost of equity for a company depends on its financial risk, which is measured by the market values of debt and equity in its capital structure. Since PEF's recommended capital structure in this proceeding embodies greater financial risk than the financial risk embodied in the cost of equity estimates for my proxy companies, the cost of equity for my proxy companies will have to be adjusted upward so that investors in PEF will have an opportunity to earn a return on their investment in PEF that is commensurate with returns they could earn on other investments of comparable risk. On the basis of my studies, I have determined that PEF requires a cost of equity of 12.3 percent to compensate investors for the higher financial risk of PEF's capital structure.

**Q. What is your recommendation regarding PEF's cost of equity?**

A. I recommend that PEF be allowed a rate of return on equity equal to 12.3 percent.

**Q. Do you have exhibits accompanying your testimony?**

A. Yes. I have prepared or supervised the preparation of the following exhibits to my testimony:

- Exhibit No. ___ (JVW-1), Summary of Discounted Cash Flow Analysis for Electric Energy Companies.
- Exhibit No. ___ (JVW-2), Summary of Discounted Cash Flow Analysis for Natural Gas Companies.

- Exhibit No. ___ (JVW-3), Comparison of the DCF Expected Return on an Investment in Electric Companies to the Interest Rate on Moody's A-Rated Utility Bonds.
- Exhibit No. ____ (JVW-4), Comparison of the DCF Expected Return on an Investment in Natural Gas Companies to the Interest Rate on Moody's A-Rated Utility Bonds.
- Exhibit No. ___ (JVW-5), Comparative Returns on S&P 500 Stock Index and Moody's A-Rated Bonds 1937—2003.
- Exhibit No. (JVW-6), Comparative Returns on S&P Utility Stock Index and Moody's A-Rated Bonds 1937—2003.
- Exhibit No. ___ (JVW-7), Using the Arithmetic Mean to Estimate the Cost of Equity Capital.
- Exhibit No. ___ (JVW-8), Calculation of Capital Asset Pricing Model Cost of Equity Using Ibbotson Associates' 7.2% Risk Premium.
- Exhibit No. ___ (JVW-9), Calculation of Capital Asset Pricing Model Cost of Equity Using DCF Estimate of the Expected Rate of Return on the Market Portfolio.
- Exhibit No. ___ (JVW-10), Derivation of the Quarterly DCF Model.
- Exhibit No. ___ (JVW-11), Adjusting for Flotation Costs in Determining a Public Utility's Allowed Rate of Return on Equity.
- Exhibit No. ___ (JVW-12), Ex Ante Risk Premium Method.
- Exhibit No. ___ (JVW-13), Ex Post Risk Premium Method.

These exhibits are true and accurate.

## II. Economic and Legal Principles.

**Q. How do economists define the required rate of return, or cost of capital, associated with particular investment decisions such as the decision to invest in electric generation, transmission, and distribution facilities?**

A. Economists define the cost of capital as the return investors expect to receive on alternative investments of comparable risk.

**Q. How does the cost of capital affect a firm's investment decisions?**

A. The goal of a firm is to maximize the value of the firm. This goal can be accomplished by accepting all investments in plant and equipment with an expected rate of return greater than the cost of capital. Thus, a firm should continue to invest in plant and equipment only so long as the return on its investment is greater than or equal to its cost of capital.

**Q. How does the cost of capital affect investors' willingness to invest in a company?**

A. The cost of capital measures the return investors can expect on investments of comparable risk. The cost of capital also measures the investor's required rate of return on investment because rational investors will not invest in a particular investment opportunity if the expected return on that opportunity is less than the cost of capital. Thus, the cost of capital is a hurdle rate for both investors and the firm.

**Q. Do all investors have the same position in the firm?**

A. No. Debt investors have a fixed claim on a firm's assets and income that must be paid prior to any payment to the firm's equity investors. Since the firm's equity investors have a residual claim on the firm's assets and income, equity investments are riskier than debt investments. Thus, the cost of equity exceeds the cost of debt.

**Q. What is the overall or average cost of capital?**

A. The overall or average cost of capital is a weighted average of the cost of debt and cost of equity, where the weights are the percentages of debt and equity in a firm's capital structure.

**Q. Can you illustrate the calculation of the overall or weighted average cost of capital?**

A. Yes. Assume that the cost of debt is 7 percent, the cost of equity is 13 percent, and the percentages of debt and equity in the firm's capital structure are 50 percent and 50 percent, respectively. Then the weighted average cost of capital is expressed by .50 times 7 percent plus .50 times 13 percent, or 10.0 percent.

**Q. How do economists define the cost of equity?**

A. Economists define the cost of equity as the return investors expect to receive on alternative equity investments of comparable risk. Since the return on an equity investment of comparable risk is not a contractual return, the cost of equity is more difficult to measure than the cost of debt. However, as I have already noted, there is agreement among economists that the cost of equity is greater than the cost of debt. There is also agreement among economists that the cost of equity, like the cost of debt, is both forward looking and market based.

**Q. How do economists measure the percentages of debt and equity in a firm's capital structure?**

A. Economists measure the percentages of debt and equity in a firm's capital structure by first calculating the market value of the firm's debt and the market value of its equity. Economists then calculate the percentage of debt by the ratio of the market value of debt to the combined market value of debt and equity, and the percentage of equity by the ratio of the market value of equity to the combined market values of debt and equity. For example, if a firm's debt has a market value of $25 million and its equity has a market value of $75 million, then its total market capitalization is $100 million, and its capital structure contains 25% debt and 75% equity.

**Q. Why do economists measure a firm's capital structure in terms of the market values of its debt and equity?**

A. Economists measure a firm's capital structure in terms of the market values of its debt and equity because: (1) the weighted average cost of capital is defined as the return investors expect to earn on a portfolio of the company's debt and equity securities; (2) investors measure the expected return and risk on their portfolios using market value weights, not book value weights; and (3) market values are the best measures of the amounts of debt and equity investors have invested in the company on a going forward basis.

**Q. Why do investors measure the return on their investment portfolios using market value weights rather than book value weights?**

A. Investors measure the return on their investment portfolios using market value weights because market value weights are the best measure of the amounts the investors currently have invested in each security in the portfolio. From the point of view of investors, the historical cost or book value of their investment is entirely irrelevant to the current risk and return on their portfolios because if they were to sell their investments, they would receive market value, not historical cost. Thus, the return can only be measured in terms of market values.

**Q. Is the economic definition of the weighted average cost of capital consistent with regulators' traditional definition of the average cost of capital?**

A. No. The economic definition of the weighted average cost of capital is based on the market costs of debt and equity, the market value percentages of debt and equity in a company's capital structure, and the future expected risk of investing

in the company. In contrast, regulators have traditionally defined the weighted average cost of capital using the embedded cost of debt and the book values of debt and equity in a company's capital structure.

**Q. Does the required rate of return on an investment vary with the risk of that investment?**

A. Yes. Since investors are averse to risk, they require a higher rate of return on investments with greater risk.

**Q. Do economists and investors consider future industry changes when they estimate the risk of a particular investment?**

A. Yes. Economists and investors consider all the risks that a firm might incur over the future life of the company.

**Q. Are these economic principles regarding the fair return for capital recognized in any Supreme Court cases?**

A. Yes. These economic principles, relating to the supply of and demand for capital, are recognized in two United States Supreme Court cases: (1) *Bluefield Water Works and Improvement Co. v. Public Service Comm'n.*; and (2) *Federal Power Comm'n v. Hope Natural Gas Co.* In the *Bluefield Water Works* case, the Court states:

> A public utility is entitled to such rates as will permit it to earn a return upon the value of the property which it employs for the convenience of the public equal to that generally being made at the same time and in

> the same general part of the country on investments in other business undertakings which are attended by corresponding risks and uncertainties; but it has no constitutional right to profits such as are realized or anticipated in highly profitable enterprises or speculative ventures. The return should be reasonably sufficient to assure confidence in the financial soundness of the utility, and should be adequate, under efficient and economical management, to maintain and support its credit, and enable it to raise the money necessary for the proper discharge of its public duties. [*Bluefield Water Works and Improvement Co. v. Public Service Comm'n.* 262 U.S. 679, 692 (1923)].

The Court clearly recognizes here that: (1) a regulated firm cannot remain financially sound unless the return it is allowed to earn on the value of its property is at least equal to the cost of capital (the principle relating to the demand for capital); and (2) a regulated firm will not be able to attract capital if it does not offer investors an opportunity to earn a return on their investment equal to the return they expect to earn on other investments of the same risk (the principle relating to the supply of capital).

In the *Hope Natural Gas* case, the Court reiterates the financial soundness and capital attraction principles of the *Bluefield* case:

> From the investor or company point of view it is important that there be enough revenue not only for operating expenses but also for the capital costs of the business. These include service on the debt and dividends on the stock... By that standard the return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks. That return, moreover, should be sufficient to assure confidence in the financial integrity of the enterprise, so as to maintain its credit and to attract capital. [*Federal Power Comm'n v. Hope Natural Gas Co.*, 320 U.S. 591, 603 (1944)].

**Q. What practical difficulties arise when one attempts to apply the economic principles noted above to a regulated firm?**

A. The application of these principles to the debt and preferred stock components of a regulated firm's capital structure is straightforward. Several problems arise, however, when the principles are applied to common equity. These problems stem from the fact that the cash flows to the equity investors, over any period of time, are not fixed by contract, and thus are not known with certainty. To induce equity investors to part with their money, a firm must offer them an expected return that is commensurate with expected returns on equity investments of similar risk. The need to measure expected returns makes the application of the above principles difficult. These difficulties are especially pronounced today for a firm like PEF, which is part of an industry that faces increased demand uncertainty, increased operating cost uncertainty, and increased uncertainty regarding the investments required to provide safe and reliable service.

**Q. How do you address these difficulties in your testimony?**

A. I address these difficulties by employing the comparable company approach to estimate PEF's cost of equity.

**Q. What is the comparable company approach?**

A. The comparable company approach estimates PEF's cost of equity by identifying a group of companies of similar risk. The cost of equity is then estimated for the companies in the proxy group.

## III. Business and Financial Risks in Electric Energy Business.

**Q. What are the primary factors that affect the business and financial risks of electric energy companies such as PEF?**

A. The business and financial risks of investing in the electric energy business are affected by a number of factors, including:

1. Demand Uncertainty. The business risk of electric energy companies is increased by the high degree of demand uncertainty in the industry. Demand uncertainty is caused by: (a) the strong dependence of electric demand on the state of the economy and weather patterns; (b) the ability of customers to choose alternative forms of energy, such as natural gas or oil; (c) the ability of some customers to locate facilities in the service areas of competitors; (d) the ability of some customers to produce their own electricity under cogeneration or self-generation arrangements; and (e) the ability of municipalities to go into the energy business rather than renew the company's franchise. Demand uncertainty is a problem for electric companies because of the need to plan for infrastructure additions many years in advance of demand.

2. Operating Expense Uncertainty. The business risk of electric energy companies is also increased by the inherent uncertainty in the typical electric energy company's operating expenses. Operating expense uncertainty arises as a result of: (a) the prospect of rising employee health care and pension expenses; (b) variability in storm-related expenses due to severe weather; (c) the prospect of increased expenses for security related to the threat of

terrorist activities; (d) high volatility in fuel prices; and (e) uncertainty in the cost of purchased power.

3. Investment Uncertainty. The electric energy business requires very large investments in the generation, transmission, and distribution facilities required to deliver energy to customers. The future amounts of required investments in these facilities are highly uncertain as a result of: (a) demand uncertainty; (b) the prospect that Congress or state legislatures will pass stricter environmental regulations and clean air requirements; (c) the prospect of needing to incur additional investments to insure the reliability of the company's transmission and distribution networks; (d) uncertainty regarding the regulatory and management structure of the electric transmission network; and (e) uncertainty regarding future decommissioning costs. Furthermore, the risk of investing in electric energy facilities is increased by the irreversible nature of the company's investments in generation, transmission, and distribution facilities. For example, if an electric energy company decides to make a major capital expenditure in a coal-fired generation plant, and, as a result of new environmental regulations, energy produced by the plant becomes uneconomic, there is little the company can do to recover its investment.

4. High Operating Leverage. The electric energy business requires a large commitment to fixed costs in relation to the operating margin on sales, a situation known as high operating leverage. The relatively high degree of fixed costs in the electric energy business arises from the average electric

energy company's large investment in fixed generation, transmission, and distribution facilities. High operating leverage causes the average electric energy company's operating income to be highly sensitive to revenue fluctuations.

5. High Degree of Financial Leverage. The large capital requirements for building economically efficient electric generation, transmission, and distribution facilities, along with the traditional regulatory preference for the use of debt, have encouraged electric utilities to maintain highly debt-leveraged capital structures as compared to non-utility firms. High debt leverage is a source of additional risk to utility stock investors because it increases the percentage of the firm's costs that are fixed. The use of financial leverage also reduces the firm's interest coverage and increases vulnerability to variations in earnings.

6. Regulatory Uncertainty. Investors' perceptions of the business and financial risks of electric energy companies are strongly influenced by their views of the quality of regulation. Investors are painfully aware that regulators in some jurisdictions have been unwilling at times to set rates that allow companies an opportunity to recover their cost of service and earn a fair and reasonable return on investment. As a result of their perceived increase in regulatory risk, investors will demand a higher rate of return for electric energy companies operating in those states. On the other hand, if investors perceive that regulators will provide a reasonable opportunity for the

company to maintain its financial integrity and earn a fair rate of return on its investment, investors will view regulatory risk as minimal.

**Q. Have any of these risk factors changed in recent years?**

A. Yes. In recent years, the risk of investing in electric energy companies has increased as a result of greater uncertainty in demand, operating expenses, and investment costs. Since the risk factors that cause this increase in risk are unlikely to diminish in the foreseeable future, the Commission should recognize these additional risks in setting PEF's allowed rate of return in this proceeding.

**Q. Can the risks facing PEF and other electric energy companies be distinguished from the risks of investing in companies in other industries?**

A. Yes. The risks of investing in electric energy companies such as PEF can be distinguished from the risks of investing in companies in many other industries in several ways. First, the risks of investing in electric energy companies are increased because of the greater capital intensity of the electric energy business and the fact that most investments in electric energy facilities are irreversible once they are made. Second, unlike returns in competitive industries, the returns from investment in the electric energy business are largely asymmetric. That is, there is little opportunity for electric energy companies to earn more than their required return, and a significant chance that they will earn less than their required return.

**Q. Has the investment community recognized that the risk of investing in electric energy companies such as PEF has increased in recent years?**

A. Yes. The fact that the investment community recognizes the increased risk of investing in the utility sector, including electric energy companies, is apparent from the large number of bond down-grades over the last several years. As shown below in Table 1, the number of bond down grades has far exceeded the number of bond upgrades since 2000.

**Table 1**

**Bond Rating Changes 2000 - 2004**

| *Year* | *Downgrade* | *Upgrade* |
|---|---|---|
| 2000 | 65 | 20 |
| 2001 | 81 | 29 |
| 2002 | 182 | 15 |
| 2003 | 139 | 8 |
| 2004 | 33 | 18 |
| **Total** | 500 | 90 |

In addition, the bond rating agencies are using more stringent criteria to assess a company's suitability to be assigned a particular bond rating.

**Q. What is PEF's current S&P bond rating?**

A. PEF's current S&P bond rating is BBB with a business risk profile of 5. Since BBB- is the lowest investment-grade bond rating, PEF's current rating is only two notches above non-investment grade.

**Q. Is a rating of BBB a reasonable target bond rating for PEF?**

A. No. As noted above, electric energy companies such as PEF face significant challenges as they seek to respond to increased uncertainty in the industry. In the face of these uncertainties, PEF should have a target bond rating of A. An A bond rating would allow PEF to attract the capital required to maintain a highly reliable electric energy system and satisfy the potentially large capital expenditures that will be required by customer growth and more rigorous environmental standards.

**Q. How do S&P's financial guidelines for an A rating differ from the financial guidelines for a BBB rating?**

A. S&P's financial guidelines for an A rating compared to a BBB rating are shown below in Table 2. (These data relate to a company such as PEF with a business profile of 5.)

**Table 2**

**S&P's Financial Guidelines for A-Rating vs. BBB-Rating**

| | *Rating* | |
|---|---|---|
| *Ratio* | *A* | *BBB* |
| Funds from Operation/Interest Coverage | 3.8x - 4.5x | 2.8x - 3.8x |
| Funds from Operations/Total Debt | 22%- 30% | 15%– 22% |
| Total Debt/Total Capital | 50%- - 42% | 60%– 50% |

**Q. Does PEF currently satisfy S&P's criteria for an A rating?**

A. No. S&P considers PEF's financial ratios to be weak for even a BBB rating. For PEF to increase its rating from BBB to A, its financial ratios must improve.

## IV. Capital Structure.

**Q. What capital structure do you recommend for the purpose of setting rates in this proceeding?**

A. I recommend that PEF's forecasted capital structure for year-end 2006 be used to set rates in this proceeding. PEF's forecasted capital structure for year-end 2006 contains 45 percent debt and 55 percent common equity.

**Q. Is PEF's forecasted capital structure at year-end 2006 sufficient to satisfy S&P's criteria for an A bond rating?**

A. No. For the purpose of assessing bond ratings, S&P imputes a percentage of PEF's long-term purchased power and co-generation contract obligations as debt. Thus, S&P would consider that PEF had more debt and less equity in assigning a bond rating than PEF shows on its balance sheet.

**Q. How does S&P calculate the specific amount of imputed debt they attribute to the company's purchased power and co-generation obligations?**

A. S&P calculates the amount of imputed debt associated with the company's purchased power obligations in three steps. First, they calculate the company's capacity payments associated with purchased power and co-generation contracts over the life of the contracts. Second, they discount the total capacity payments in each year to a present value using a discount rate of 10 percent. Third, they assign a risk factor to the present value of the capacity payments to determine the imputed debt associated with the capacity payments.

**Q. What risk factor does S&P use for PEF's purchased power and co-generation contracts at this time?**

A. S&P assigns a risk factor of 30 percent to PEF's purchased power and co-generation contracts.

**Q. Using this risk factor, what is the forecasted value of imputed debt for PEF's purchased power and co-generation contracts at year-end 2006?**

A. The forecasted imputed debt using S&P's methodology for year-end 2006 is $757 million.

**Q. Using this level of imputed debt, what capital structure ratios would S&P use to assess PEF's bond rating?**

A. As shown below in Table 3, for the purpose of determining PEF's bond rating, S&P's methodology indicates that they would assign a capital structure to PEF containing 50.99 percent debt, 0.60 percent preferred, and 48.41 percent common equity.

| Capital Source | Amount | Weight | PP Adjustment | Adjusted Amount | Adjusted Weight |
|---|---|---|---|---|---|
| Debt | 2,111 | 43.37% | 757 | 2,868 | 50.99% |
| Preferred | 33 | 0.69% | | 33 | 0.60% |
| Common | 2,722 | 55.94% | | 2,722 | 48.41% |
| Total Capital | 4,866 | 100.00% | | 5,623 | 100.00% |

**Q. Is it important that the Commission recognize the implications of imputed debt when it determines the appropriate capital structure for use in setting rates in this proceeding?**

A. Yes. The Commission should recognize that electric energy companies such as PEF are facing increased risk as a result of the greater uncertainty in operating expenses and capital investments required to provide safe and reliable service. In view of this greater risk, PEF should be encouraged to maintain financial ratios that increase the likelihood that its bond rating will be raised to the A level. If the Commission does not recognize the implications of imputed debt when it determines the appropriate capital structure for use in setting rates in this proceeding, it is unlikely that PEF's financial ratios can improve sufficiently to earn an A bond rating.

**Q. How does your recommended capital structure for PEF compare to the capital structure the Florida Commission used to set rates in Florida Power & Light Company's (FPL) last rate proceeding?**

A. In FPL's last rate proceeding, the Commission used a capital structure containing 41.69 percent debt, 2.31 percent preferred stock, and 56.00 percent common equity. Thus, my recommended capital structure is consistent with the capital structure the Commission has previously used to set rates for FPL.

## V. Cost of Equity Estimation Methods.

**Q. What methods did you use to estimate the cost of common equity capital for PEF?**

A. I used three generally accepted methods for estimating PEF's cost of common equity. These are the Discounted Cash Flow (DCF), risk premium, and CAPM methods. The DCF method assumes that the current market price of a firm's stock is equal to the discounted value of all expected future cash flows. The risk premium method assumes that investors' required return on an equity investment is equal to the interest rate on a long-term bond plus an additional equity risk premium to compensate the investor for the risks of investing in equities compared to bonds. The CAPM assumes that the investors' required rate of return is equal to a risk-free rate of interest plus the product of a company-specific risk factor, beta, and the expected risk premium on the market portfolio.

## VI. Discounted Cash Flow (DCF) Method.

**Q. Please describe the DCF model.**

A. The DCF model is based on the assumption that investors value an asset on the basis of the future cash flows they expect to receive from owning the asset. Thus, investors value an investment in a bond because they expect to receive a sequence of semi-annual coupon payments over the life of the bond and a terminal payment equal to the bond's face value at the time the bond matures. Likewise, investors value an investment in a firm's stock because they expect to receive a sequence of dividend payments and, perhaps, expect to sell the stock at a higher price sometime in the future.

A second fundamental principle of the DCF method is that investors value a dollar received in the future less than a dollar received today. A future dollar is valued less than a current dollar because investors could invest a current dollar in an interest earning account and increase their wealth. This principle is called the time value of money.

Applying the two fundamental DCF principles noted above to an investment in a bond leads to the conclusion that investors value their investment in the bond on the basis of the present value of the bond's future cash flows. Thus, the price of the bond should be equal to:

**EQUATION 1**

$$P_B = \frac{C}{(1+i)} + \frac{C}{(1+i)^2} + \ldots + \frac{C+F}{(1+i)^n}$$

where:

$P_B$ = Bond price;

C = Cash value of the coupon payment (assumed for notational convenience to occur annually rather than semi-annually);

F = Face value of the bond;

i = The rate of interest the investor could earn by investing his money in an alternative bond of equal risk; and

n = The number of periods before the bond matures.

Applying these same principles to an investment in a firm's stock suggests that the price of the stock should be equal to:

**EQUATION 2**

$$P_s = \frac{D_1}{(1+k)} + \frac{D_2}{(1+k)^2} + \cdots + \frac{D_n + P_n}{(1+k)^n}$$

where:

$P_S$ = Current price of the firm's stock;

$D_1, D_2 \ldots D_n$ = Expected annual dividend per share on the firm's stock;

$P_n$ = Price per share of stock at the time the investor expects to sell the stock; and

k = Return the investor expects to earn on alternative investments of the same risk, i.e., the investor's required rate of return.

Equation (2) is frequently called the annual discounted cash flow model of stock valuation. Assuming that dividends grow at a constant annual rate, *g*, this equation can be solved for *k*, the cost of equity. The resulting cost of equity equation is $k = D_1/P_s + g$, where *k* is the cost of equity, $D_1$ is the expected next period annual dividend, $P_s$ is the current price of the stock, and *g* is the constant annual growth rate in earnings, dividends, and book value per share. The term $D_1/P_s$ is called the dividend yield component of the annual DCF model, and the term *g* is called the growth component of the annual DCF model.

**Q. Are you recommending that the annual DCF model be used to estimate PEF's cost of equity?**

A. No. The DCF model assumes that a company's stock price is equal to the present discounted value of all expected future dividends. The annual DCF model is only a correct expression for the present value of future dividends if dividends are paid annually at the end of each year. Since the companies in my proxy group all pay dividends quarterly, the current market price that investors are willing to pay reflects the expected quarterly receipt of dividends. Therefore, a quarterly DCF model must be used to estimate the cost of equity for these firms. The quarterly DCF model differs from the annual DCF model in that it expresses a company's price as the present value of a quarterly stream of dividend payments. A complete analysis of the implications of the quarterly payment of dividends on the DCF model is provided in Exhibit No. ___ (JVW-10), Appendix 1. For the reasons cited there, I employed the quarterly DCF model throughout my calculations.

**Q. Please describe the quarterly DCF model you used.**

A. The quarterly DCF model I used is described in Exhibit No. ___ (JVW-1) and in Exhibit No. ___ (JVW-10), Appendix 1. The quarterly DCF equation shows that the cost of equity is: the sum of the future expected dividend yield and the growth rate, where the dividend in the dividend yield is the equivalent future value of the four quarterly dividends at the end of the year, and the growth rate is the expected growth in dividends or earnings per share.

**Q. How did you estimate the quarterly dividend payments in your quarterly DCF model?**

A. The quarterly DCF model requires an estimate of the dividends, $d_1$, $d_2$, $d_3$, and $d_4$, investors expect to receive over the next four quarters. I estimated the next four quarterly dividends by multiplying the previous four quarterly dividends by the factor, (1 + the growth rate, g).

**Q. Can you illustrate how you estimated the next four quarterly dividends with data for a specific company?**

A. Yes. In the case of Alliant Energy, the first company shown in Exhibit No. ___ (JVW-1), the last four quarterly dividends are equal to .25, .25, .265, and .265. Thus dividends, $d_1$, $d_2$, $d_3$, and $d_4$ are equal to .2581 and .2736 [.25 x (1 + .0325) = .2581] and [.25 x (1 + .0325) = .2736]. (As noted previously, the logic underlying this procedure is described in Exhibit No. ___ **(JVW-10), Appendix** 1.)

**Q. In Exhibit No. ___ (JVW-10), Appendix 1, you demonstrate that the quarterly DCF model provides the theoretically correct valuation of stocks when dividends are paid quarterly. Do investors, in practice, recognize the actual timing and magnitude of cash flows when they value stocks and other securities?**

A. Yes. In valuing long-term government or corporate bonds, investors recognize that interest is paid semi-annually. Thus, the price of a long-term government or corporate bond is simply the present value of the semi-annual interest and principal payments on these bonds. Likewise, in valuing mortgages, investors recognize that interest is paid monthly. Thus, the value of a mortgage loan is simply the present value of the monthly interest and principal payments on the loan. In valuing stock investments, stock investors correctly recognize that dividends are paid quarterly. Thus, a firm's stock price is the present value of the stream of quarterly dividends expected from owning the stock.

**Q. When valuing bonds, mortgages, or stocks, would investors assume that cash flows are received only at the end of the year, when, in fact, the cash flows are received semi-annually, quarterly, or monthly?**

A. No. Assuming that cash flows are received at the end of the year when they are received semi-annually, quarterly, or monthly would lead investors to make serious mistakes in valuing investment opportunities. No rational investor would make the mistake of assuming that dividends or other cash flows are paid annually when, in fact, they are paid more frequently.

**Q. How did you estimate the growth component of the quarterly DCF model?**

A. I used the analysts' estimates of future earnings per share (EPS) growth reported by I/B/E/S Thomson Financial.

**Q. What are the analysts' estimates of future EPS growth?**

A. As part of their research, financial analysts working at Wall Street firms periodically estimate EPS growth for each firm they follow. The EPS forecasts for each firm are then published. Investors who are contemplating purchasing or selling shares in individual companies review the forecasts. These estimates represent five-year forecasts of EPS growth.

**Q. What is I/B/E/S?**

A. I/B/E/S is a firm that reports analysts' EPS growth forecasts for a broad group of companies. The forecasts are expressed in terms of a mean forecast and a standard deviation of forecast for each firm. Investors use the mean forecast as a consensus estimate of future firm performance.

**Q. Why did you use the I/B/E/S growth estimates?**

A. The I/B/E/S growth rates: (1) are widely circulated in the financial community, (2) include the projections of reputable financial analysts who develop estimates of future EPS growth, (3) are reported on a timely basis to investors, and (4) are widely used by institutional and other investors.

**Q. Why did you rely on analysts' projections of future EPS growth in estimating the investors' expected growth rate rather than looking at past historical growth rates?**

A. I relied on analysts' projections of future EPS growth because there is considerable empirical evidence that investors use analysts' forecasts to estimate future earnings growth.

**Q. Have you performed any studies concerning the use of analysts' forecasts as an estimate of investors' expected growth rate, g?**

A. Yes, I prepared a study in conjunction with Willard T. Carleton, Karl Eller Professor of Finance at the University of Arizona, on why analysts' forecasts are the best estimate of investors' expectation of future long-term growth. This study is described in a paper entitled "Investor Growth Expectations and Stock Prices: the Analysts versus Historical Growth Extrapolation," published in the Spring 1988 edition of *The Journal of Portfolio Management.*

**Q. Please summarize the results of your study.**

A. First, we performed a correlation analysis to identify the historically oriented growth rates which best described a firm's stock price. Then we did a regression study comparing the historical growth rates with the consensus analysts' forecasts. In every case, the regression equations containing the average of analysts' forecasts statistically outperformed the regression equations containing the historical growth estimates. These results are consistent with those found by Cragg and Malkiel, the early major research in this area (John G. Cragg and Burton G. Malkiel, *Expectations and the Structure of Share Prices*, University of Chicago Press, 1982). These results are also consistent with the hypothesis that

investors use analysts' forecasts, rather than historically oriented growth calculations, in making stock buy and sell decisions. They provide overwhelming evidence that the analysts' forecasts of future growth are superior to historically-oriented growth measures in predicting a firm's stock price.

**Q. Has your study been updated to include more recent data?**

A. Yes. Researchers at State Street Financial Advisors updated my study using data through year-end 2003. Their results continue to confirm that analysts' growth forecasts are superior to historically-oriented growth measures in predicting a firm's stock price.

**Q. What price did you use in your DCF model?**

A. I used a simple average of the monthly high and low stock prices for each firm for the three-month period ending March 2005. These high and low stock prices were obtained from Thomson Financial.

**Q. Why did you use the three-month average stock price in applying the DCF method?**

A. I used the three-month average stock price in applying the DCF method because stock prices fluctuate daily, while financial analysts' forecasts for a given company are generally changed less frequently, often on a quarterly basis. Thus, to match the stock price with an earnings forecast, it is appropriate to average stock prices over a three-month period.

**Q. Did you include an allowance for flotation costs in your DCF analysis?**

A. Yes. I have included a five percent allowance for flotation costs in my DCF calculations.

**Q. Please explain your inclusion of flotation costs.**

A. All firms that have sold securities in the capital markets have incurred some level of flotation costs, including underwriters' commissions, legal fees, printing expense, etc. These costs are withheld from the proceeds of the stock sale or are paid separately, and must be recovered over the life of the equity issue. Costs vary depending upon the size of the issue, the type of registration method used and other factors, but in general these costs range between three and five percent of the proceeds from the issue [see Lee, Inmoo, Scott Lochhead, Jay Ritter, and Quanshui Zhao, "The Costs of Raising Capital," *The Journal of Financial Research*, Vol. XIX No 1 (Spring 1996), 59-74, and Clifford W. Smith, "Alternative Methods for Raising Capital," *Journal of Financial Economics* 5 (1977) 273-307]. In addition to these costs, for large equity issues (in relation to outstanding equity shares), there is likely to be a decline in price associated with the sale of shares to the public. On average, the decline due to market pressure has been estimated at two to three percent [see Richard H. Pettway, "The Effects of New Equity Sales Upon Utility Share Prices," *Public Utilities Fortnightly*, May 10, 1984, 35—39]. Thus, the total flotation cost, including both issuance expense and market pressure, could range anywhere from five to eight percent of

the proceeds of an equity issue. I believe a combined five percent allowance for flotation costs is a conservative estimate that should be used in applying the DCF model in this proceeding.

**Q. Is a flotation cost adjustment only appropriate if a company issues stock during the last year?**

A As described in Exhibit No. ___ (JVW-11), Appendix 2, a flotation cost adjustment is required whether or not a company issued new stock during the last year. Previously incurred flotation costs have not been recovered in previous rate cases; rather, they are a permanent cost associated with past issues of common stock. Just as an adjustment is made to the embedded cost of debt to reflect previously incurred debt issuance costs (regardless of whether additional bond issuances were made in the test year), so should an adjustment be made to the cost of equity regardless of whether additional stock was issued during the last year.

**Q. Does an allowance for recovery of flotation costs associated with stock sales in prior years constitute retroactive rate-making?**

A. No. An adjustment for flotation costs on equity is not meant to recover any cost that is properly assigned to prior years. In fact, the adjustment allows PEF to recover only the current carrying costs associated with flotation expenses incurred at the time stock sales were made. The original flotation costs

themselves will never be recovered, because the stock is assumed to have an infinite life.

**Q. How did you apply the DCF approach to obtain the cost of equity capital for PEF?**

A. I applied the DCF approach to the Value Line electric companies shown in Exhibit No. ___ (JVW-1), and to the Value Line natural gas companies shown in Exhibit No. ___ (JVW-2).

**Q. How did you select your proxy group of electric companies?**

A. I selected all the companies in Value Line's groups of electric companies that: (1) paid dividends during every quarter of the last two years; (2) did not decrease dividends during any quarter of the past two years; (3) had at least three analysts included in the I/B/E/S mean growth forecast; (4) have an investment grade bond rating and a Value Line Safety Rank of 1, 2, or 3; and (5) have not announced a merger.

**Q. Why did you eliminate companies that have either decreased or eliminated their dividend in the past two years?**

A. The DCF model requires the assumption that dividends will grow at a constant rate into the indefinite future. If a company has either decreased or eliminated its dividend in recent years, an assumption that the company's dividend will grow at the same rate into the indefinite future is questionable.

**Q. Why did you eliminate companies that have fewer than three analysts included in the I/B/E/S mean forecasts?**

A. The DCF model also requires a reliable estimate of a company's expected future growth. For most companies, the I/B/E/S mean growth forecast is the best available estimate of the growth term in the DCF model. However, the I/B/E/S estimate may be less reliable if the mean estimate is based on the inputs of very few analysts. On the basis of my professional judgment, I believe that at least three analysts' estimates are a reasonable minimum number.

**Q. Why did you eliminate companies that have announced mergers that are not yet completed?**

A. A merger announcement can sometimes have a significant impact on a company's stock price because of anticipated merger-related cost savings and new market opportunities. Analysts' growth forecasts, on the other hand, are necessarily related to companies as they currently exist, and do not reflect investors' views of the potential cost savings and new market opportunities associated with mergers. The use of a stock price that includes the value of potential mergers in conjunction with growth forecasts that do not include the growth enhancing prospects of potential mergers produces DCF results that tend to distort a company's cost of equity.

**Q. Is your electric company proxy group comparable in risk to PEF?**

A. Yes. Many investors use the Value Line Safety Rank as a measure of equity risk. As shown in Exhibit No. ___ (JVW-1), the average Value Line Safety Rank for my proxy group of electric companies is 2, on a scale where 1 is the most safe and 5 is the least safe, and the Value Line Safety Rank for PEF's parent is 2. The average S&P bond rating of the electric companies in my proxy group is approximately BBB+, with an average business risk profile of 5.7, on a scale from 1 to 10 where 1 is strong and 10 is weak. The S&P bond rating for PEF's parent is BBB with a business risk profile of 6.

**Q. Please summarize the results of your application of the DCF model to the Value Line electric company proxy group.**

A. As shown in Exhibit No. ___ (JVW-1), I obtain a DCF result of 9.4 percent. Given investors' perceptions that the risk of investing in electric utilities has increased in recent years, I believe that the DCF result for the Value Line electric companies understates PEF's true cost of equity. However, to be conservative, I will consider this result, along with my other cost of equity results, when I reach my conclusion regarding PEF's cost of equity.

**Q. Does the DCF model produce an economically reasonable estimate of PEF's cost of equity at this time?**

A. No. There are several reasons why the results of applying the DCF model to electric utilities do not make economic sense at this time. First, the DCF results for the electric utilities have displayed considerable volatility over the last

several years. In contrast to the general pattern of equity costs varying within a more narrow range than interest rates, the DCF result for the electric utilities has varied within a much wider range than interest rates over the last five years, 445 basis points for DCF results versus 309 basis points for interest rates. Furthermore, the standard deviation of the DCF results is 152 basis points, as compared to the standard deviation of interest rates of just 83 basis points. The high volatility of DCF results for electric utilities compared to interest rates suggests that the DCF model is not providing an accurate indication of the electric utilities' cost of equity at this time.

Second, the DCF results for electric utilities deviate significantly from the cost of equity results obtained from other widely used cost of equity methodologies such as the risk premium and CAPM methodologies. The large deviation of the DCF results for electric utilities from the results of applying other cost of equity methods to the same companies suggests that the DCF model is not providing an appropriate indication of the electric utilities' cost of equity at this time.

**Q. As noted above, you also applied the DCF model to a proxy group of natural gas companies. Why did you apply the DCF model to a proxy group of natural gas companies?**

A. I applied the DCF model to a proxy group of natural gas companies in addition to a group of electric companies because the natural gas companies are similar in risk to the electric companies, and, as a group, are experiencing less industry

restructuring than the electric companies.[2] In addition, it is useful to examine the cost of equity results for a group of similar companies from a closely associated industry in order to test the reasonableness of the results obtained by applying cost of equity methodologies to electric companies. Financial theory does not require that companies be in exactly the same industry to be comparable in risk.

**Q. What natural gas companies did you include in your proxy group of natural gas companies?**

A. I selected all the companies in Value Line's groups of natural gas companies that receive a significant percentage of revenues and income from regulated natural gas businesses and otherwise meet the same criteria as described above for the electric companies. The natural gas companies in my DCF group and the average DCF result are shown in Exhibit No. ___ (JVW-2).

**Q. How are your proxy natural gas companies similar to PEF?**

A. Like PEF, my proxy natural gas companies: (1) employ a capital-intensive physical network that connects the customer to the source of energy; (2) sell transmission and/or distribution services at regulated rates to customers whose energy demand is primarily dependent on the state of the economy and the

[2] The DCF model is based on the assumption that companies operate in a relatively stable environment. When companies are experiencing dramatic industry restructuring, the basic stability assumptions of the DCF model may not apply.

weather; (3) procure energy in energy markets with highly variable prices; and (4) are regulated by public utility commissions that have traditionally viewed electric and natural gas utilities as being comparable in risk.

**Q. Do you have any empirical evidence that the natural gas companies in your proxy group are a conservative proxy for PEF?**

A. Yes. The average Value Line Safety Rank for my proxy group of natural gas companies is 2, on a scale where 1 is the most safe and 5 is the least safe, compared to the Safety Rank of 2 for PEF's parent (see Exhibit No. ___ (JVW-2)). In addition, the average S&P bond rating and business profile of the natural gas companies in my proxy group is approximately A, with an average business profile of 4 (where 1 is least risky and 10 is most risky). In contrast, as noted above, PEF's parent has an S&P bond rating of BBB with a business profile of 6. These data provide evidence that the natural gas proxy group is somewhat less risky than the electric proxy group.

**Q. Please summarize the results of your application of the DCF method to the Value Line natural gas companies.**

A. My application of the DCF method to the Value Line natural gas companies produces an average DCF result of 9.9 percent, as shown in Exhibit No. ___ (JVW-2). I believe this result also understates PEF's true cost of equity because, as demonstrated above, the Value Line natural gas companies are less risky than both the electric proxy group and PEF.

## VII. Risk Premium Method.

**Q. Please describe the risk premium method of estimating PEF's cost of equity.**

A. The risk premium method is based on the principle that investors expect to earn a return on an equity investment in PEF that reflects a "premium" over and above the return they expect to earn on an investment in a portfolio of bonds. This equity risk premium compensates equity investors for the additional risk they bear in making equity investments versus bond investments.

**Q. Does the risk premium approach specify what debt instrument should be used to estimate the interest rate component in the methodology?**

A. No. The risk premium approach can be implemented using virtually any debt instrument. However, the risk premium approach does require that the debt instrument used to estimate the risk premium be the same as the debt instrument used to calculate the interest rate component of the risk premium approach. For example, if the risk premium on equity is calculated by comparing the returns on stocks and the returns on A-rated utility bonds, then the interest rate on A-rated utility bonds must be used to estimate the interest rate component of the risk premium approach.

**Q. Does the risk premium approach require that the same companies be used to estimate the stock return as are used to estimate the bond return?**

A. No. For example, many analysts apply the risk premium approach by comparing the return on a portfolio of stocks to the return on Treasury securities such as

long-term Treasury bonds. Clearly, in this widely-accepted application of the risk premium approach, the same companies are not used to estimate the stock return as are used to estimate the bond return, since the U.S. government is not a company.

**Q. How did you measure the required risk premium on an equity investment in PEF?**

A. I used two methods to estimate the required risk premium on an equity investment in PEF. The first is called the ex ante risk premium method and the second is called the ex post risk premium method.

**1. Ex Ante Risk Premium Method**

**Q. Please describe your ex ante risk premium approach for measuring the required risk premium on an equity investment in PEF.**

A. My ex ante risk premium method is based on studies of the DCF expected return on proxy groups of electric and natural gas companies compared to the interest rate on Moody's A-rated utility bonds. Specifically, for each month in my study period, I calculated the risk premium using the equation,

$$RP_{PROXY} = DCF_{PROXY} - I_A$$

where:

$RP_{PROXY}$ = the required risk premium on an equity investment in the proxy group of companies,

$DCF_{PROXY}$ = average DCF estimated cost of equity on a portfolio of proxy companies; and

$I_A$ = the yield to maturity on an investment in A-rated utility bonds.

I then performed a regression analysis to determine if there were a relationship between the calculated risk premium and interest rates. Finally, I used the results of the regression analysis to estimate the investors' required risk premium. To estimate the cost of equity, I then added the required risk premium to the forecasted interest rate on A-rated utility bonds. A detailed description of my ex ante risk premium studies is contained in Exhibit No. ___ (JVW-12), Appendix 3, and the underlying DCF results and interest rates are displayed in Exhibit No. ___ (JVW-3).

**Q. What cost of equity do you obtain from your ex ante risk premium method using the proxy group of electric companies?**

A. To estimate the cost of equity using the ex ante risk premium method, one may add the estimated risk premium over the yield on A-rated utility bonds to the yield to maturity on A-rated utility bonds. At March 2005, the forecasted yield to maturity on A-rated utility bonds for 2006 is 6.94 percent. My analyses produce an estimated risk premium over the yield on A-rated utility bonds equal to 4.38 percent. Adding an estimated risk premium of 4.38 percent to the 2006 forecasted 6.94 percent average yield to maturity on A-rated utility bonds

produces a cost of equity estimate of 11.3 percent using the ex ante risk premium method.

**Q. Have you also applied your ex ante risk premium approach to a proxy group of natural gas companies?**

A. Yes. Following the same procedure as described in Exhibit No. ___ (JVW-12), Appendix 3, I applied my ex ante risk premium approach to my proxy group of natural gas companies compared to the interest rate on A-rated utility bonds. The underlying DCF results and interest rates for this study are displayed in Exhibit No. ___ (JVW-4).

**Q. What cost of equity do you obtain from your ex ante risk premium method using the proxy group of natural gas companies?**

A. For the natural gas proxy group, my analyses produce an estimated risk premium over the yield on A-rated utility bonds equal to 4.69 percent. Adding an estimated risk premium of 4.69 percent to the 6.94 percent forecasted yield to maturity on A-rated utility bonds produces a cost of equity estimate of 11.6 percent using the ex ante risk premium method.

**Q. What cost of equity do you obtain from your ex ante risk premium method?**

A. The ex ante risk premium method using the electric proxy group produced a cost of equity estimate of 11.3 percent, and using the natural gas proxy group, a cost

of equity estimate of 11.6 percent. Averaging these estimates produces a cost of equity estimate of 11.5 percent using the ex ante risk premium method.

**2. Ex Post Risk Premium Method**

**Q. Please describe your ex post risk premium method for measuring the required risk premium on an equity investment in PEF.**

A. I first performed a study of the comparable returns received by bond and stock investors over the last 67 years. I estimated the returns on stock and bond portfolios, using stock price and dividend yield data on the S&P 500 and bond yield data on Moody's A-rated utility bonds. My study consisted of making an investment of one dollar in the S&P 500 and Moody's A-rated utility bonds at the beginning of 1937, and reinvesting the principal plus return each year to 2004. The return associated with each stock portfolio is the sum of the annual dividend yield and capital gain (or loss) which accrued to this portfolio during the year(s) in which it was held. The return associated with the bond portfolio, on the other hand, is the sum of the annual coupon yield and capital gain (or loss) which accrued to the bond portfolio during the year(s) in which it was held. The resulting annual returns on the stock and bond portfolios purchased in each year between 1937 and 2004 are shown in Exhibit No. ___ (JVW-5). The average annual return on an investment in the S&P 500 stock portfolio was 11.67 percent, while the average annual return on an investment in the Moody's A-rated utility bond portfolio was 6.40 percent. The risk premium on the S&P 500 stock portfolio is, therefore, 5.27 percent.

I also conducted a second study using stock data on the S&P Utilities rather than the S&P 500. As shown in Exhibit No. ___ (JVW-6), the S&P Utility stock portfolio showed an average annual return of 10.57 percent per year. Thus, the return on the S&P Utility stock portfolio exceeded the return on the Moody's A-rated utility bond portfolio by 4.16 percent.

**Q. Why is it appropriate to perform your ex post risk premium analysis using both the S&P 500 and the S&P Utility Stock indices?**

A. I have performed my ex post risk premium analysis on both the S&P 500 and the S&P Utilities as upper and lower bounds for the required risk premium on an equity investment in PEF because I believe electric energy companies today face risks that are somewhere in between the average risk of the S&P Utilities and the S&P 500 over the years 1937 to 2004. Specifically, the risk premium on the S&P Utilities, 4.16 percent, represents a lower bound for the required risk premium on an equity investment in PEF because PEF is currently more risky than an investment in the average utility in the S&P Utilities index over the entire period 1936 to the present. On the other hand, the risk premium on the S&P 500, 5.27 percent, represents an upper bound because an investment in PEF is less risky than an investment in the S&P 500 over the period 1937 to the present. I use the average of the two risk premiums as my estimate of the required risk premium for PEF in my ex post risk premium method.

**Q. Why did you analyze investors' experiences over such a long time frame?**

A. Because day-to-day stock price movements can be somewhat random, it is inappropriate to rely on short-run movements in stock prices in order to derive a reliable risk premium. Rather than buying and selling frequently in anticipation of highly volatile price movements, most investors employ a strategy of buying and holding a diversified portfolio of stocks. This buy-and-hold strategy will allow an investor to achieve a much more predictable long-run return on stock investments and at the same time will minimize transaction costs. The situation is very similar to the problem of predicting the results of coin tosses. I cannot predict with any reasonable degree of accuracy the result of a single, or even a few, flips of a balanced coin; but I can predict with a good deal of confidence that approximately 50 heads will appear in 100 tosses of this coin. Under these circumstances, it is most appropriate to estimate future experience from long-run evidence of investment performance.

**Q. Would your study provide a different risk premium if you started with a different time period?**

A. Yes. The risk premium results do vary somewhat depending on the historical time period chosen. My policy was to go back as far in history as I could get reliable data. I thought it would be most meaningful to begin after the passage and implementation of the Public Utility Holding Company Act of 1935. This Act significantly changed the structure of the public utility industry. Since the Public Utility Holding Company Act of 1935 was not implemented until the

beginning of 1937, I felt that numbers taken from before this date would not be comparable to those taken after.

**Q. Why was it necessary to examine the yield from debt investments in order to determine the investors' required rate of return on equity capital?**

A. As previously explained, investors expect to earn a return on their equity investment that exceeds currently available bond yields. This is because the return on equity, being a residual return, is less certain than the yield on bonds and investors must be compensated for this uncertainty. Second, the investors' current expectations concerning the amount by which the return on equity will exceed the bond yield will be strongly influenced by historical differences in returns to bond and stock investors. For these reasons, we can estimate investors' current expected returns from an equity investment from knowledge of current bond yields and past differences between returns on stocks and bonds.

**Q. Has there been any significant trend in the equity risk premium over the 1937 to 2004 time period of your risk premium study?**

A. No. Statisticians test for trends in data series by regressing the data observations against time. I have performed such a time series regression on my two data sets of historical risk premiums. As shown below in Tables 4 and 5, there is no statistically significant trend in my risk premium data. Indeed, the coefficient on the time variable is insignificantly different from zero (if there were a trend, the coefficient on the time variable should be significantly different from zero).

**TABLE 4**
**REGRESSION OUTPUT FOR RISK PREMIUM ON S&P 500**

| Line No. | | Intercept | Time | Adjusted R Square | F |
|---|---|---|---|---|---|
| 1 | Coefficient | 0.015 | 0.001 | 0.002 | 1.124 |
| 2 | T Statistic | 0.354 | 1.060 | | |

**TABLE 5**
**REGRESSION OUTPUT FOR RISK PREMIUM ON S&P UTILITIES**

| Line No. | | Intercept | Time | Adjusted R Square | F |
|---|---|---|---|---|---|
| 1 | Coefficient | 0.007 | 0.001 | 0.002 | 1.136 |
| 2 | T Statistic | 0.195 | 1.066 | | |

**Q. Do you have any other evidence that there has been no significant trend in risk premium results over time?**

A. Yes. The Ibbotson Associates' *2004 Yearbook* contains an analysis of "trends" in risk premium data. Ibbotson Associates uses correlation analysis to determine if there is any pattern or "trend" in risk premiums over time. They also conclude that there are no trends in risk premiums over time.

**Q. What is the significance of the evidence that historical risk premiums have no trend or other statistical pattern over time?**

A. The significance of this evidence is that the average historical risk premium is a good estimate of the future expected risk premium. As Ibbotson notes:

> The significance of this evidence is that the realized equity risk premium next year will not be dependent on the realized equity risk premium from this year. That is, there is no discernable pattern in the realized equity risk premium—it is virtually impossible to forecast next year's realized risk premium based on the premium of the previous year. For example, if this year's difference between the riskless rate and the return on the stock market is higher than last year's, that does not imply that next year's will be higher than this year's. It is as likely to be higher as it is lower. The best estimate of the expected value of a variable that has behaved randomly in the past is the average (or arithmetic mean) of its past values. [Ibbotson Associates' *Valuation Edition 2004 Yearbook*, page 75.]

**Q. You noted that Ibbotson Associates also provides risk premium data. How do the Ibbotson Associates' risk premiums compare to your risk premiums?**

A. Ibbotson Associates obtains a 7.2 percent risk premium on the S&P 500 versus long-term government bonds. Since the yield on long - term government bonds is currently approximately 100 basis points less than the yield on A - rated utility bonds, the Ibbotson Associates' data would indicate an approximate 6.2 percent risk premium on the S&P 500 over A - rated utility bonds. As shown on Exhibit Nos. (JVW-5) and (JVW-6) my studies produce a risk premium over A - rated utility bonds in the range of 4.16 percent to 5.27 percent.

**Q. What conclusions do you draw from your ex post risk premium analyses about the required return on an equity investment in PEF?**

A. My own studies, combined with my analysis of other studies, provide strong evidence that investors today require an equity return of approximately 4.16 to 5.27 percentage points above the expected yield on A-rated utility bonds. The

5.27 percentage points above the expected yield on A-rated utility bonds. The forecasted interest rate on Moody's A - rated utility bonds for the end of the test year as of March 2005 is 6.94 percent. Adding a 4.16 to 5.27 percentage point risk premium to an expected yield of 6.94 percent on A-rated utility bonds, I obtain an expected return on equity in the range 11.1 percent to 12.2 percent, with a midpoint of 11.7 percent. Adding a 25 basis-point allowance for flotation costs,[3] I obtain an estimate of 11.9 percent as the cost of equity for PEF using the ex post risk premium method.

### 3. Capital Asset Pricing Model (CAPM)

**Q What is the CAPM?**

A The CAPM is an equilibrium model of the security markets in which the expected or required return on a given security is equal to the risk-free rate of interest, plus the company equity "beta," times the market risk premium:

*Cost of equity = Risk-free rate + Equity beta x Market risk premium.*

The risk-free rate in this equation is the expected rate of return on a risk-free government security, the equity beta is a measure of the company's risk relative to the market as a whole, and the market risk premium is the premium investors require to invest in the market basket of all securities compared to the risk-free security.

[3] I determined the flotation cost allowance by calculating the difference in my DCF results with and without a flotation cost allowance.

**Q How do you use the CAPM to estimate the cost of equity for your proxy companies?**

A The CAPM requires an estimate of the risk-free rate, the company-specific risk factor or beta, and the expected return on the market portfolio. For my estimate of the risk-free rate, I use the Blue Chip forecasted yield to maturity on 20-year Treasury bonds for 2006, 5.70%. For my estimate of the company-specific risk, or beta, I use the average Value Line beta for my proxy companies. For my estimate of the expected risk premium on the market portfolio, I use two approaches. First, I estimate the risk premium on the market portfolio from the difference between the arithmetic mean return on the S&P 500 and the income return on 20-year Treasury bonds as reported by Ibbotson Associates' *2004 Yearbook*. Second, I estimate the risk premium on the market portfolio from the difference between the DCF cost of equity for the S&P 500 and the yield to maturity on 20-year Treasury bonds.

**Q. Why do you recommend that the risk premium on the market portfolio be estimated using the difference between the arithmetic mean return on the S&P 500 and the income return on 20-year Treasury bonds?**

A. I recommend that the long-run historic arithmetic mean risk premium be used to estimate the cost of equity because the arithmetic mean is the best estimate of the expected risk premium on a forward-looking basis. As Ibbotson Associates explains in *Stocks, Bonds, Bills, and Inflation Valuation Edition 2004 Yearbook*,

the arithmetic mean return is the best approach for calculating the return investors expect to receive in the future:

> The equity risk premium data presented in this book are arithmetic average risk premia as opposed to geometric average risk premia. The arithmetic average equity risk premium can be demonstrated to be most appropriate when discounting future cash flows. For use as the expected equity risk premium in either the CAPM or the building block approach, the arithmetic mean or the simple difference of the arithmetic means of stock market returns and riskless rates is the relevant number. This is because both the CAPM and the building block approach are additive models, in which the cost of capital is the sum of its parts. The geometric average is more appropriate for reporting past performance, since it represents the compound average return. [Ibbotson Associates, *op. cit.*, p. 71.]

A discussion of the importance of using arithmetic mean returns in the context of CAPM or risk premium studies is contained in Exhibit No. ___ (JVW-7).

**Q. What CAPM result do you obtain when you estimate the expected return on the market portfolio from the arithmetic mean difference between the return on the market and the yield on 20-year Treasury bonds?**

A. I obtain a CAPM estimate of 11.8 percent, as shown in Exhibit No. (JVW-8).

**Q. What CAPM result do you obtain when you estimate the market risk premium on the market portfolio by applying the DCF model to the S&P 500?**

A. I obtain a CAPM result of 12.0 percent when forecasted interest rates are used to estimate the risk-free rate (see Exhibit No. ___ (JVW-9)).

**Q. Is there any evidence that a reasonable application of the CAPM may produce higher cost of equity results than you have just reported?**

A. Yes. There are several reasons why a reasonable application of the CAPM may produce higher results than I have just reported. First, there is substantial evidence that the CAPM tends to underestimate the cost of equity for companies whose equity beta is less than 1.0 and to overestimate the cost of equity for companies whose equity beta is greater than 1.0. Second, there is strong evidence that a size premium should be added to the CAPM result for some of my electric and natural gas proxy companies.

**Q. What evidence do you have that the CAPM tends to underestimate the cost of equity for companies with betas less than 1.0?**

A. The original evidence that the unadjusted CAPM tends to underestimate the cost of equity for companies whose equity beta is less than 1.0 and to overestimate the cost of equity for companies whose equity beta is greater than 1.0 was presented in a paper by Black, Jensen, and Scholes, "The Capital Asset Pricing Model: Some Empirical Tests." Numerous subsequent papers have validated the

Black, Jensen, and Scholes findings, including those by Litzenberger and Ramaswamy, Banz, Fama and French, and Fama and MacBeth.[4]

**Q. Do you have any evidence that the CAPM equation must be adjusted to account for a company's size as measured by market capitalization?**

A. Yes. Chapter 7 of the Ibbotson Associates' *2004 Yearbook, Valuation Edition*, provides evidence that investors in smaller capitalization companies require a higher rate of return than is indicated by the unadjusted CAPM equation. In addition, Ibbotson Associates provides estimates of the size premium required to be added to the basic CAPM cost of equity, shown below in Table 6.

**Table 6**

**Ibbotson Estimates of Premiums for Company Size**

| Size | Smallest Mkt. Cap. ($000s) | Premium |
|---|---|---|
| Large-Cap (No Adjustment) | 4,794,027 | - |
| Mid-Cap | 1,167,040 | 0.91% |
| Low-Cap | 330,797 | 1.70% |
| Micro-Cap | 0.332 | 4.01% |

[4] Fischer Black, Michael C. Jensen, and Myron Scholes, "The Capital Asset Pricing Model: Some Empirical Tests," in *Studies in the Theory of Capital Markets*, M. Jensen, ed. New York: Praeger, 1972; Eugene Fama and James MacBeth, "Risk, Return, and Equilibrium: Empirical Tests," *Journal of Political Economy* 81 (1973), pp. 607-36; Robert Litzenberger and Krishna Ramaswamy, "The Effect of Personal Taxes and Dividends on Capital Asset Prices: Theory and Empirical Evidence," *Journal of Financial Economics* 7 (1979), pp. 163-95.; Rolf Banz, "The Relationship between Return and Market Value of Common Stocks," *Journal of Financial Economics* (March 1981), pp. 3-18; and Eugene Fama and Kenneth French, "The Cross-Section of Expected Returns," *Journal of Finance* (June 1992), pp. 427-465.

## B. Fair Rate of Return on Equity

**Q. Based on your application of several cost of equity methods to your proxy companies, what is your conclusion regarding your proxy companies' cost of equity?**

A. Based on my application of several cost of equity methods to my proxy companies, I conservatively conclude that my proxy companies' cost of equity is 11.4 percent. As shown in Table 7 below, 11.4 percent is the simple average of the cost of equity results I obtain from my cost of equity models.

| *Method* | *Cost of Equity* |
|---|---|
| DCF | 9.6% |
| Ex Post Risk Premium | 11.9% |
| Ex Ante Risk Premium | 11.5% |
| DCF CAPM | 12.0% |
| Historical CAPM | 11.8% |
| **Average All Cost of Equity Methods** | 11.4% |

**Q. Does your 11.4 percent cost of equity conclusion for your proxy groups depend on the percentages of debt and equity in your proxy companies' average capital structure?**

A. Yes. The 11.4 percent cost of equity for my proxy groups reflects the financial risk associated with my proxy companies' average capital structures, where the capital structure weights are measured in terms of market values. Since financial leverage, that is, the use of debt financing, increases the risk of investing in the

proxy companies' equity, the cost of equity would be higher for a capital structure containing more leverage.

**Q. What are the average percentages of debt and equity in your proxy companies' capital structures?**

A. As shown below in Table 8, my electric proxy company group has an average capital structure containing 40.70 percent debt, 1.34 percent preferred stock, and 57.97 percent common equity. My natural gas proxy company group has an average capital structure containing 33.90 percent debt, 0.24 percent preferred equity, and 65.86 percent equity, as shown in Table 9.

**Q. How does PEF's projected capital structure at December 31, 2006 compare to the average capital structure of your proxy companies?**

A. PEF's projected capital structure at December 31, 2006, contains 45 percent long-term debt and 55 percent common equity. Although this capital structure contains an appropriate mix of debt and equity and is a reasonable capital structure for ratemaking purposes, from an investors' viewpoint, PEF's capital structure embodies greater financial risk than the average market value capital structures of my proxy company groups.

**Q. You noted earlier that the cost of equity depends on a company's capital structure. Is there any way to adjust the 11.4 percent cost of equity for**

**your proxy companies to reflect the higher financial risk embodied in PEF's recommended capital structure in this proceeding?**

A. Yes. Since my proxy groups are comparable in risk to PEF, PEF should have the same weighted average cost of capital as my proxy companies. It is a simple matter to determine what cost of equity PEF should have in order to have the same weighted average cost of capital as my proxy companies.

**Q. Have you performed such a calculation?**

A. Yes. I adjusted the 11.4 percent average cost of equity for my proxy groups by recognizing that to attract capital, PEF must have the same weighted average cost of capital as my proxy group. As shown in Table 8, the weighted average cost of capital for my proxy group of electric companies is 8.433 percent. The weighted average cost of capital for my proxy group of natural gas companies is 8.962 percent, as shown in Table 9. The average cost of capital for both proxy groups is 8.697 percent. As shown in Table 10, PEF would require a 12.35 percent cost of equity in order to have the same weighted average cost of capital as the proxy groups.

**TABLE 8**

**Weighted Average Cost of Capital Electric Proxy Group**

| Line No. | Capital Source | Percent | After-tax Cost Rate | Weighted Cost |
|---|---|---|---|---|
| 1 | Long-term Debt | 40.70% | 4.23% | 1.723% |
| 2 | Preferred Stock | 1.34% | 7.64% | 0.102% |
| 3 | Common Equity | 57.97% | 11.40% | 6.608% |
| 4 | | 100.00% | | 8.433% |

**TABLE 9**

**Weighted Average Cost of Capital Natural Gas Company Proxy Group**

| Line No. | Capital Source | Percent | After-tax Cost Rate | Weighted Cost |
|---|---|---|---|---|
| 1 | Long-term Debt | 33.90% | 4.23% | 1.435% |
| 2 | Preferred Stock | 0.24% | 7.64% | 0.018% |
| 3 | Common Equity | 65.86% | 11.40% | 7.508% |
| 4 | | 100.00% | | 8.962% |

**TABLE 10**

**Weighted Average Cost of Capital PEF**

| Line No. | Capital Source | Percent | After-tax Cost Rate | Weighted Cost |
|---|---|---|---|---|
| 1 | Long-term Debt | 45.00% | 4.23% | 1.905% |
| 2 | Preferred Stock | 0.00% | 7.64% | 0.000% |
| 3 | Common Equity | 55.00% | 12.35% | 6.792% |
| 4 | | 100.00% | | 8.697% |

**Q. What is your recommendation as to a fair rate of return on common equity for PEF?**

A. I recommend that PEF be allowed a fair rate of return on common equity equal to 12.3 percent.

**Q. Does this conclude your testimony?**

A. Yes, it does.

**PROGRESS ENERGY FLORIDA**
**SUMMARY OF DISCOUNTED CASH FLOW ANALYSIS**
**FOR ELECTRIC ENERGY COMPANIES**

| *Line No.* | *Company* | *d4* | *$P_0$* | *Growth* | *Market Cap $ (Mil)* | *Cost of Equity* |
|---|---|---|---|---|---|---|
| 1 | Alliant Energy | 0.265 | 27.223 | 3.25% | 3,144 | 7.5% |
| 2 | Ameren Corp. | 0.635 | 49.967 | 3.07% | 9,734 | 8.8% |
| 4 | Cinergy Corp. | 0.480 | 40.613 | 4.44% | 7,351 | 9.7% |
| 5 | Consol. Edison | 0.570 | 43.008 | 3.35% | 10,404 | 9.3% |
| 6 | Constellation Energy | 0.335 | 50.043 | 7.76% | 8,803 | 10.6% |
| 7 | Dominion Resources | 0.670 | 70.897 | 5.49% | 23,467 | 9.7% |
| 9 | DTE Energy | 0.515 | 44.137 | 4.50% | 7,680 | 9.8% |
| 10 | Duke Energy | 0.275 | 26.608 | 4.26% | 24,959 | 8.9% |
| 11 | Energy East Corp. | 0.275 | 26.020 | 4.00% | 3,822 | 8.6% |
| 12 | Entergy Corp. | 0.540 | 68.778 | 6.81% | 15,489 | 10.2% |
| 13 | FirstEnergy Corp. | 0.413 | 40.265 | 3.83% | 13,279 | 8.1% |
| 14 | FPL Group | 0.355 | 38.772 | 4.77% | 7,196 | 8.7% |
| 15 | G't Plains Energy | 0.415 | 30.553 | 3.00% | 2,270 | 9.1% |
| 16 | Hawaiian Elec. | 0.310 | 27.508 | 2.50% | 2,217 | 7.5% |
| 17 | MDU Resources | 0.180 | 26.987 | 7.80% | 3,184 | 10.9% |
| 18 | Northeast Utilities | 0.163 | 18.748 | 4.50% | 2,458 | 8.4% |
| 19 | NSTAR | 0.580 | 55.645 | 4.33% | 2,960 | 8.9% |
| 20 | OGE Energy | 0.333 | 26.340 | 3.33% | 2,344 | 9.0% |
| 21 | Pepco Holdings | 0.250 | 21.760 | 4.00% | 3,756 | 9.2% |
| 22 | Pinnacle West Capital | 0.475 | 42.427 | 4.50% | 3,886 | 9.5% |
| 23 | PPL Corp. | 0.460 | 53.530 | 5.56% | 10,117 | 9.2% |
| 24 | Progress Energy | 0.590 | 43.343 | 3.98% | 10,706 | 10.0% |
| 25 | Puget Energy Inc. | 0.250 | 23.302 | 5.60% | 2,323 | 10.6% |
| 26 | SCANA Corp. | 0.390 | 38.557 | 4.50% | 4,330 | 8.9% |
| 27 | Sempra Energy | 0.250 | 38.593 | 6.25% | 8,992 | 9.2% |
| 28 | Southern Co. | 0.358 | 32.720 | 4.69% | 24,203 | 9.7% |
| 30 | Vectren Corp. | 0.295 | 26.902 | 6.27% | 2,045 | 11.3% |
| 31 | Wisconsin Energy | 0.220 | 34.662 | 6.20% | 4,055 | 9.0% |
| 32 | WPS Resources | 0.555 | 51.688 | 4.33% | 1,933 | 9.2% |
| 33 | **Xcel Energy Inc.** | **0.208** | **17.655** | **3.83%** | **7,060** | 9.0% |
| 34 | **Market Weighted** Average | | | | | 9.4% |

Notes:

| | | |
|---|---|---|
| $d_1,d_2,d_3,d_4$ | = | Next four quarterly dividends, calculated by multiplying the last four quarterly dividends per Value Line by the factor (1 + g). |
| $P_0$ | = | Average of the monthly high and low stock prices during the three months ending March 2005 per Thomson Financial. |
| FC | = | Flotation costs expressed as a percent of gross proceeds. |
| g | = | I/B/E/S forecast of future earnings growth March 2005. |
| k | = | Cost of equity using the quarterly version of the DCF model. |

$$k = \frac{d_1(1+k)^{.75} + d_2(1+k)^{.50} + d_3(1+k)^{.25} + d_4}{P_0(1-FC)} + g$$

**PROGRESS ENERGY FLORIDA**
**RISK RATINGS**
**OF PROXY ELECTRIC ENERGY COMPANIES**

| *Line No.* | *Company* | *March 2005 S&P BOND RATING* | *March 2005 S&P BOND RATING (Numerical)* | *S&P Bus. Risk* | *Safety Rank* |
|---|---|---|---|---|---|
| 1 | Alliant Energy | BBB+ | 7 | 6 | 3 |
| 2 | Ameren Corp. | A- | 6 | 6 | 1 |
| 4 | Cinergy Corp. | BBB+ | 7 | 6 | 2 |
| 5 | Consol. Edison | A | 5 | 2 | 1 |
| 6 | Constellation Energy | BBB+ | 7 | 7 | 2 |
| 7 | Dominion Resources | BBB+ | 7 | 7 | 2 |
| 9 | DTE Energy | BBB | 8 | 6 | 3 |
| 10 | Duke Energy | BBB | 8 | 7 | 3 |
| 11 | Energy East Corp. | BBB+ | 7 | 3 | 2 |
| 12 | Entergy Corp. | BBB | 8 | 6 | 2 |
| 13 | FirstEnergy Corp. | BBB- | 9 | 6 | 3 |
| 14 | FPL Group | A | 5 | 6 | 1 |
| 15 | G't Plains Energy | BBB | 8 | 7 | 2 |
| 16 | Hawaiian Elec. | BBB | 8 | 6 | 2 |
| 17 | MDU Resources | A- | 6 | 7 | 1 |
| 18 | Northeast Utilities | BBB+ | 7 | 5 | 3 |
| 19 | NSTAR | A | 5 | 1 | 1 |
| 20 | OGE Energy | BBB+ | 7 | 6 | 3 |
| 21 | Pepco Holdings | BBB+ | 7 | 5 | 3 |
| 22 | Pinnacle West Capital | BBB | 8 | 6 | 1 |
| 23 | PPL Corp. | BBB | 8 | 7 | 3 |
| 24 | Progress Energy | BBB | 8 | 6 | 2 |
| 25 | Puget Energy Inc. | BBB- | 9 | 4 | 3 |
| 26 | SCANA Corp. | A- | 6 | 4 | 2 |
| 27 | Sempra Energy | BBB+ | 7 | 7 | 2 |
| 28 | Southern Co. | A | 5 | 4 | 2 |
| 30 | Vectren Corp. | A- | 6 | 4 | 2 |
| 31 | Wisconsin Energy | BBB+ | 7 | 5 | 2 |
| 32 | WPS Resources | A | 5 | 5 | 2 |
| 33 | Xcel Energy Inc. | BBB | 8 | 5 | 2 |
| **34** | | BBB+ | 7.0 | 5.7 | 2.1 |

Source of data: Standard & Poor's, March 2005; The Value Line Investment Analyzer March 2005

**PROGRESS ENERGY FLORIDA**
**SUMMARY OF DISCOUNTED CASH FLOW ANALYSIS**
**FOR NATURAL GAS COMPANIES**

| *Line No.* | *Company* | *d4* | *Price* | *Growth* | *Market Cap $ (Mil)* | *Cost of Equity* |
|---|---|---|---|---|---|---|
| 1 | AGL Resources | 0.310 | 34.452 | 4.32% | 2,250 | 8.2% |
| 2 | Atmos Energy | 0.310 | 27.517 | 4.40% | 2,182 | 9.5% |
| 3 | Equitable Resources | 0.380 | 58.538 | 9.50% | 3,594 | 12.6% |
| 4 | KeySpan Corp. | 0.455 | 39.428 | 4.20% | 6,332 | 9.3% |
| 5 | New Jersey Resources | 0.340 | 43.520 | 5.86% | 1,158 | 9.4% |
| 6 | NICOR Inc. | 0.465 | 36.955 | 1.83% | 1,630 | 7.4% |
| 7 | Northwest Nat. Gas | 0.325 | 34.937 | 5.50% | 957 | 9.8% |
| 8 | ONEOK Inc. | 0.250 | 28.908 | 6.50% | 2,989 | 10.3% |
| 9 | Peoples Energy | 0.545 | 43.047 | 4.25% | 1,631 | 10.0% |
| 10 | Piedmont Natural Gas | 0.230 | 23.250 | 5.25% | 1,781 | 9.6% |
| 11 | Questar Corp. | 0.215 | 52.690 | 8.50% | 4,442 | 10.4% |
| 12 | Southwest Gas | 0.205 | 24.895 | 6.47% | 894 | 10.3% |
| 13 | WGL Holdings Inc. | 0.325 | 30.613 | 3.88% | 1,491 | 8.7% |
| **15** | Market Weighted Average. | | | | | 9.9% |

Notes:

$d_1,d_2,d_3,d_4$ = Next four quarterly dividends, calculated by multiplying the last four quarterly dividends per Value Line by the factor (1 + g).

$P_0$ = Average of the monthly high and low stock prices during the three months ending March 2005 per Thomson Financial.

FC = Flotation costs expressed as a percent of gross proceeds.

g = I/B/E/S forecast of future earnings growth March 2005.

k = Cost of equity using the quarterly version of the DCF model.

$$k = \frac{d_1(1+k)^{.75} + d_2(1+k)^{.50} + d_3(1+k)^{.25} + d_4}{P_0(1-FC)} + g$$

**PROGRESS ENERGY FLORIDA**
**RISK RATINGS**
**OF PROXY GAS COMPANIES**

| *Line No.* | *Company* | *March 2005 S&P BOND RATING* | *March 2005 S&P BOND RATING (Numerical)* | *S&P Bus. Profile* | *Value Line Safety Rank* |
|---|---|---|---|---|---|
| 1 | AGL Resources | A- | 6 | 4 | 2 |
| 2 | Atmos Energy | BBB | 8 | 4 | 3 |
| 3 | Equitable Resources | A | 5 | 6 | 2 |
| 4 | KeySpan Corp. | A | 5 | 4 | 2 |
| 5 | *New Jersey Resources* | A+ | 4 | 2 | 2 |
| 6 | NICOR Inc. | AA | 2 | 3 | 2 |
| 7 | Northwest Nat. Gas | A+ | 4 | 1 | 2 |
| 8 | ONEOK Inc. | BBB+ | 7 | 6 | 3 |
| 9 | Peoples Energy | A- | 6 | 5 | 1 |
| 10 | Piedmont Natural Gas | A | 5 | 2 | 2 |
| 11 | *Questar Gas* | A+ | 4 | 3 | 2 |
| 12 | Southwest Gas | BBB- | 9 | 3 | 3 |
| 13 | WGL Holdings Inc. | AA- | 3 | 3 | 1 |
| **14** | Average | A | 5.2 | 3.9 | 2.1 |

Source of data: Standard & Poor's, March 2005; The Value Line Investment Analyzer March 2005.

**PROGRESS ENERGY FLORIDA**
**COMPARISON OF DCF EXPECTED RETURN ON AN INVESTMENT IN ELECTRIC COMPANIES**
**TO THE INTEREST RATE ON MOODY'S A-RATED UTILITY BONDS**

| *Date* | *DCF* | *A-Rated Bond Yield* |
|---|---|---|
| Sep-99 | 0.1169 | 0.0793 |
| Oct-99 | 0.1177 | 0.0806 |
| Nov-99 | 0.1208 | 0.0794 |
| Dec-99 | 0.1258 | 0.0814 |
| Jan-00 | 0.1250 | 0.0835 |
| Feb-00 | 0.1294 | 0.0825 |
| Mar-00 | 0.1336 | 0.0828 |
| Apr-00 | 0.1257 | 0.0829 |
| May-00 | 0.1242 | 0.0870 |
| Jun-00 | 0.1266 | 0.0836 |
| Jul-00 | 0.1276 | 0.0825 |
| Aug-00 | 0.1247 | 0.0813 |
| Sep-00 | 0.1180 | 0.0823 |
| Oct-00 | 0.1182 | 0.0814 |
| Nov-00 | 0.1187 | 0.0811 |
| Dec-00 | 0.1169 | 0.0784 |
| Jan-01 | 0.1205 | 0.0780 |
| Feb-01 | 0.1210 | 0.0774 |
| Mar-01 | 0.1215 | 0.0768 |
| Apr-01 | 0.1277 | 0.0794 |
| May-01 | 0.1304 | 0.0799 |
| Jun-01 | 0.1316 | 0.0785 |
| Jul-01 | 0.1330 | 0.0778 |
| Aug-01 | 0.1333 | 0.0759 |
| Sep-01 | 0.1355 | 0.0775 |
| Oct-01 | 0.1354 | 0.0763 |
| Nov-01 | 0.1358 | 0.0757 |
| Dec-01 | 0.1353 | 0.0783 |

| *Date* | *DCF* | *A-Rated Bond Yield* |
|---|---|---|
| Jan-02 | 0.1332 | 0.0766 |
| Feb-02 | 0.1348 | 0.0754 |
| Mar-02 | 0.1306 | 0.0776 |
| Apr-02 | 0.1267 | 0.0757 |
| May-02 | 0.1276 | 0.0752 |
| Jun-02 | 0.1273 | 0.0741 |
| Jul-02 | 0.1363 | 0.0731 |
| Aug-02 | 0.1312 | 0.0717 |
| Sep-02 | 0.1321 | 0.0708 |
| Oct-02 | 0.1330 | 0.0723 |
| Nov-02 | 0.1274 | 0.0714 |
| Dec-02 | 0.1238 | 0.0707 |
| Jan-03 | 0.1198 | 0.0706 |
| Feb-03 | 0.1241 | 0.0693 |
| Mar-03 | 0.1192 | 0.0679 |
| Apr-03 | 0.1152 | 0.0664 |
| May-03 | 0.1088 | 0.0636 |
| Jun-03 | 0.1042 | 0.0621 |
| Jul-03 | 0.1052 | 0.0657 |
| Aug-03 | 0.1054 | 0.0678 |
| Sep-03 | 0.1022 | 0.0656 |
| Oct-03 | 0.1005 | 0.0643 |
| Nov-03 | 0.0990 | 0.0637 |
| Dec-03 | 0.0960 | 0.0627 |
| Jan-04 | 0.0931 | 0.0615 |
| Feb-04 | 0.0927 | 0.0615 |
| Mar-04 | 0.0919 | 0.0597 |
| Apr-04 | 0.0932 | 0.0635 |
| May-04 | 0.0971 | 0.0662 |
| Jun-04 | 0.0970 | 0.0646 |
| Jul-04 | 0.0970 | 0.0627 |
| Aug-04 | 0.0970 | 0.0614 |
| Sep-04 | 0.0966 | 0.0598 |
| Oct-04 | 0.0964 | 0.0594 |
| Nov-04 | 0.0922 | 0.0597 |
| Dec-04 | 0.0921 | 0.0592 |

| *Date* | *DCF* | *A-Rated Bond Yield* |
|---|---|---|
| Jan-05 | 0.0923 | 0.0578 |
| Feb-05 | 0.0922 | 0.0561 |
| Mar-05 | 0.0920 | 0.0583 |
| Average | 0.1165 | 0.0720 |

Notes: Utility bond yield information from *Mergent Bond Record* (formerly Moody's). See Appendix 3 for a description of my ex ante risk premium approach. DCF results are calculated using a quarterly DCF model as follows:

$D_0$ = Latest quarterly dividend per Value Line
$P_0$ = Average of the monthly high and low stock prices for each month per S&P Stock Guide
FC = Flotation costs expressed as a percent of gross proceeds.
g = I/B/E/S forecast of future earnings growth for each month.
k = Cost of equity using the quarterly version of the DCF model.

$$k = \left[ \frac{d_0 (1+g)^{\frac{1}{4}}}{P_0 (1-FC)} \right]^4 - 1$$

**PROGRESS ENERGY FLORIDA**
**COMPARISON OF DCF EXPECTED RETURN ON AN INVESTMENT IN NATURAL GAS COMPANIES**
**TO THE INTEREST RATE ON MOODY'S A-RATED UTILITY BONDS**

| *Date* | *DCF* | *A-Rated Bond Yield* |
|---|---|---|
| June-98 | 0.11046 | 0.0703 |
| July-98 | 0.11296 | 0.0703 |
| August-98 | 0.1202 | 0.0700 |
| September-98 | 0.1255 | 0.0693 |
| October-98 | 0.1256 | 0.0696 |
| November-98 | 0.1197 | 0.0703 |
| December-98 | 0.1159 | 0.0691 |
| January-99 | 0.1176 | 0.0697 |
| February-99 | 0.1219 | 0.0709 |
| March-99 | 0.1247 | 0.0726 |
| April-99 | 0.1253 | 0.0722 |
| May-99 | 0.1223 | 0.0747 |
| June-99 | 0.1214 | 0.0774 |
| July-99 | 0.1226 | 0.0771 |
| August-99 | 0.1223 | 0.0791 |
| September-99 | 0.1229 | 0.0793 |
| October-99 | 0.1243 | 0.0806 |
| November-99 | 0.1259 | 0.0794 |
| December-99 | 0.1302 | 0.0814 |
| January-00 | 0.1325 | 0.0835 |
| February-00 | 0.1371 | 0.0825 |
| March-00 | 0.1356 | 0.0828 |
| April-00 | 0.1331 | 0.0829 |
| May-00 | 0.1301 | 0.0870 |
| June-00 | 0.1300 | 0.0836 |
| July-00 | 0.1325 | 0.0825 |
| August-00 | 0.1298 | 0.0813 |

| *Date* | *DCF* | *A-Rated Bond Yield* |
|---|---|---|
| September-00 | 0.1268 | 0.0823 |
| October-00 | 0.1272 | 0.0814 |
| November-00 | 0.1246 | 0.0811 |
| December-00 | 0.1227 | 0.0784 |
| January-01 | 0.1251 | 0.0780 |
| February-01 | 0.1260 | 0.0774 |
| March-01 | 0.1273 | 0.0768 |
| April-01 | 0.1244 | 0.0794 |
| May-01 | 0.1311 | 0.0799 |
| June-01 | 0.1316 | 0.0785 |
| July-01 | 0.1341 | 0.0778 |
| August-01 | 0.1342 | 0.0759 |
| September-01 | 0.1247 | 0.0775 |
| October-01 | 0.1258 | 0.0763 |
| November-01 | 0.1265 | 0.0757 |
| December-01 | 0.1247 | 0.0783 |
| January-02 | 0.1224 | 0.0766 |
| February-02 | 0.1230 | 0.0754 |
| March-02 | 0.1167 | 0.0776 |
| April-02 | 0.1132 | 0.0757 |
| May-02 | 0.1130 | 0.0752 |
| June-02 | 0.1138 | 0.0741 |
| July-02 | 0.1219 | 0.0731 |
| August-02 | 0.1207 | 0.0717 |
| September-02 | 0.1245 | 0.0708 |
| October-02 | 0.1228 | 0.0723 |
| November-02 | 0.1194 | 0.0714 |
| December-02 | 0.1190 | 0.0707 |
| January-03 | 0.1194 | 0.0706 |
| February-03 | 0.1211 | 0.0693 |
| March-03 | 0.1184 | 0.0679 |
| April-03 | 0.1157 | 0.0664 |
| May-03 | 0.1110 | 0.0636 |
| June-03 | 0.1101 | 0.0621 |
| July-03 | 0.1103 | 0.0657 |
| August-03 | 0.1112 | 0.0678 |
| September-03 | 0.1097 | 0.0656 |

| *Date* | *DCF* | *A-Rated Bond Yield* |
|---|---|---|
| October-03 | 0.1094 | 0.0643 |
| November-03 | 0.1061 | 0.0637 |
| December-03 | 0.1040 | 0.0627 |
| January-04 | 0.1059 | 0.0615 |
| February-04 | 0.1039 | 0.0615 |
| March-04 | 0.1037 | 0.0597 |
| April-04 | 0.1041 | 0.0635 |
| May-04 | 0.1045 | 0.0662 |
| June-04 | 0.1036 | 0.0646 |
| July-04 | 0.1011 | 0.0627 |
| August-04 | 0.1008 | 0.0614 |
| September-04 | 0.0999 | 0.0598 |
| October-04 | 0.0998 | 0.0594 |
| November-04 | 0.0986 | 0.0597 |
| December-04 | 0.0995 | 0.0592 |
| January-05 | 0.0990 | 0.0578 |
| February-2005 | 0.0979 | 0.0561 |
| March-2005 | 0.0979 | 0.0583 |
| Average | 0.1184 | 0.0721 |

Notes: Utility bond yield information from *Mergent Bond Record* (formerly Moody's). See Appendix 3 for a description of my ex ante risk premium approach. DCF results are calculated using a quarterly DCF model as follows:

$D_0$ = Latest quarterly dividend per Value Line
$P_0$ = Average of the monthly high and low stock prices for each month per S&P Stock Guide
FC = Flotation costs expressed as a percent of gross proceeds.
g = I/B/E/S forecast of future earnings growth for each month
k = Cost of equity using the quarterly version of the DCF model.

$$k = \left[ \frac{d_0 (1+g)^{\frac{1}{4}}}{P_0 (1-FC)} \right]^4 - 1$$

**PROGRESS ENERGY FLORIDA**
**COMPARATIVE RETURNS ON S&P 500 STOCK INDEX**
**AND MOODY'S A-RATED BONDS 1937—2004**

| *Line No.* | *Year* | *S&P 500 Stock Price* | *Stock Dividend Yield* | *Stock Return* | *Bond Price* | *Bond Return* |
|---|---|---|---|---|---|---|
| 1 | 2004 | 1,132.52 | 0.0161 | | $70.87 | |
| 2 | 2003 | 895.84 | 0.0180 | 28.22% | $62.26 | 20.27% |
| 3 | 2002 | 1,140.21 | 0.0138 | -20.05% | $57.44 | 15.35% |
| 4 | 2001 | 1,335.63 | 0.0116 | -13.47% | $56.40 | 8.93% |
| 5 | 2000 | 1,425.59 | 0.0118 | -5.13% | $52.60 | 14.82% |
| 6 | 1999 | 1,248.77 | 0.0130 | 15.46% | $63.03 | -10.20% |
| 7 | 1998 | 963.35 | 0.0162 | 31.25% | $62.43 | 7.38% |
| 8 | 1997 | 766.22 | 0.0195 | 27.68% | $56.62 | 17.32% |
| 9 | 1996 | 614.42 | 0.0231 | 27.02% | $60.91 | -0.48% |
| 10 | 1995 | 465.25 | 0.0287 | 34.93% | $50.22 | 29.26% |
| 11 | 1994 | 472.99 | 0.0269 | 1.05% | $60.01 | -9.65% |
| 12 | 1993 | 435.23 | 0.0288 | 11.56% | $53.13 | 20.48% |
| 13 | 1992 | 416.08 | 0.0290 | 7.50% | $49.56 | 15.27% |
| 14 | 1991 | 325.49 | 0.0382 | 31.65% | $44.84 | 19.44% |
| 15 | 1990 | 339.97 | 0.0341 | -0.85% | $45.60 | 7.11% |
| 16 | 1989 | 285.41 | 0.0364 | 22.76% | $43.06 | 15.18% |
| 17 | 1988 | 250.48 | 0.0366 | 17.61% | $40.10 | 17.36% |
| 18 | 1987 | 264.51 | 0.0317 | -2.13% | $48.92 | -9.84% |
| 19 | 1986 | 208.19 | 0.0390 | 30.95% | $39.98 | 32.36% |
| 20 | 1985 | 171.61 | 0.0451 | 25.83% | $32.57 | 35.05% |
| 21 | 1984 | 166.39 | 0.0427 | 7.41% | $31.49 | 16.12% |
| 22 | 1983 | 144.27 | 0.0479 | 20.12% | $29.41 | 20.65% |
| 23 | 1982 | 117.28 | 0.0595 | 28.96% | $24.48 | 36.48% |
| 24 | 1981 | 132.97 | 0.0480 | -7.00% | $29.37 | -3.01% |
| 25 | 1980 | 110.87 | 0.0541 | 25.34% | $34.69 | -3.81% |
| 26 | 1979 | 99.71 | 0.0533 | 16.52% | $43.91 | -11.89% |
| 27 | 1978 | 90.25 | 0.0532 | 15.80% | $49.09 | -2.40% |
| 28 | 1977 | 103.80 | 0.0399 | -9.06% | $50.95 | 4.20% |

| *Line No.* | *Year* | *S&P 500 Stock Price* | *Stock Dividend Yield* | *Stock Return* | *Bond Price* | *Bond Return* |
|---|---|---|---|---|---|---|
| 29 | 1976 | 96.86 | 0.0380 | 10.96% | $43.91 | 25.13% |
| 30 | 1975 | 72.56 | 0.0507 | 38.56% | $41.76 | 14.75% |
| 31 | 1974 | 96.11 | 0.0364 | -20.86% | $52.54 | -12.91% |
| 32 | 1973 | 118.40 | 0.0269 | -16.14% | $58.51 | -3.37% |
| 33 | 1972 | 103.30 | 0.0296 | 17.58% | $56.47 | 10.69% |
| 34 | 1971 | 93.49 | 0.0332 | 13.81% | $53.93 | 12.13% |
| 35 | 1970 | 90.31 | 0.0356 | 7.08% | $50.46 | 14.81% |
| 36 | 1969 | 102.00 | 0.0306 | -8.40% | $62.43 | -12.76% |
| 37 | 1968 | 95.04 | 0.0313 | 10.45% | $66.97 | -0.81% |
| 38 | 1967 | 84.45 | 0.0351 | 16.05% | $78.69 | -9.81% |
| 39 | 1966 | 93.32 | 0.0302 | -6.48% | $86.57 | -4.48% |
| 40 | 1965 | 86.12 | 0.0299 | 11.35% | $91.40 | -0.91% |
| 41 | 1964 | 76.45 | 0.0305 | 15.70% | $92.01 | 3.68% |
| 42 | 1963 | 65.06 | 0.0331 | 20.82% | $93.56 | 2.61% |
| 43 | 1962 | 69.07 | 0.0297 | -2.84% | $89.60 | 8.89% |
| 44 | 1961 | 59.72 | 0.0328 | 18.94% | $89.74 | 4.29% |
| 45 | 1960 | 58.03 | 0.0327 | 6.18% | $84.36 | 11.13% |
| 46 | 1959 | 55.62 | 0.0324 | 7.57% | $91.55 | -3.49% |
| 47 | 1958 | 41.12 | 0.0448 | 39.74% | $101.22 | -5.60% |
| 48 | 1957 | 45.43 | 0.0431 | -5.18% | $100.70 | 4.49% |
| 49 | 1956 | 44.15 | 0.0424 | 7.14% | $113.00 | -7.35% |
| 50 | 1955 | 35.60 | 0.0438 | 28.40% | $116.77 | 0.20% |
| 51 | 1954 | 25.46 | 0.0569 | 45.52% | $112.79 | 7.07% |
| 52 | 1953 | 26.18 | 0.0545 | 2.70% | $114.24 | 2.24% |
| 53 | 1952 | 24.19 | 0.0582 | 14.05% | $113.41 | 4.26% |
| 54 | 1951 | 21.21 | 0.0634 | 20.39% | $123.44 | -4.89% |
| 55 | 1950 | 16.88 | 0.0665 | 32.30% | $125.08 | 1.89% |
| 56 | 1949 | 15.36 | 0.0620 | 16.10% | $119.82 | 7.72% |
| 57 | 1948 | 14.83 | 0.0571 | 9.28% | $118.50 | 4.49% |
| 58 | 1947 | 15.21 | 0.0449 | 1.99% | $126.02 | -2.79% |
| 59 | 1946 | 18.02 | 0.0356 | -12.03% | $126.74 | 2.59% |
| 60 | 1945 | 13.49 | 0.0460 | 38.18% | $119.82 | 9.11% |
| 61 | 1944 | 11.85 | 0.0495 | 18.79% | $119.82 | 3.34% |
| 62 | 1943 | 10.09 | 0.0554 | 22.98% | $118.50 | 4.49% |
| 63 | 1942 | 8.93 | 0.0788 | 20.87% | $117.63 | 4.14% |

| *Line No.* | *Year* | *S&P 500 Stock Price* | *Stock Dividend Yield* | *Stock Return* | *Bond Price* | *Bond Return* |
|---|---|---|---|---|---|---|
| 64 | 1941 | 10.55 | 0.0638 | -8.98% | $116.34 | 4.55% |
| 65 | 1940 | 12.30 | 0.0458 | -9.65% | $112.39 | 7.08% |
| 66 | 1939 | 12.50 | 0.0349 | 1.89% | $105.75 | 10.05% |
| 67 | 1938 | 11.31 | 0.0784 | 18.36% | $99.83 | 9.94% |
| 68 | 1937 | 17.59 | 0.0434 | -31.36% | $103.18 | 0.63% |
| | Return 1937-- | | | | | |
| 69 | 2004 | Stocks | 11.67% | | | |
| 70 | | Bonds | 6.40% | | | |
| 71 | Risk Premium | | 5.27% | | | |

Note: See Appendix 4, for an explanation of how stock and bond returns are derived and the source of the data presented.

**PROGRESS ENERGY FLORIDA**
**COMPARATIVE RETURNS ON S&P UTILITY STOCK INDEX**
**AND MOODY'S A-RATED BONDS 1937—2004**

| *Line No.* | *Year* | *S&P Utilities Stock Price* | *Stock Dividend Yield* | *Stock Return* | *Bond Price* | *Bond Return* |
|---|---|---|---|---|---|---|
| 1 | 2004 | 139.79 | | | $70.87 | |
| 2 | 2003 | 114.11 | 0.0508 | 27.58% | $62.26 | 20.27% |
| 3 | 2002 | 142.14 | 0.0454 | -15.18% | $57.44 | 15.35% |
| 4 | | | | | | |
| 5 | 2002 | 243.79 | 0.0362 | | $57.44 | |
| 6 | 2001 | 307.70 | 0.0287 | -17.90% | $56.40 | 8.93% |
| 7 | 2000 | 239.17 | 0.0413 | 32.78% | $52.60 | 14.82% |
| 8 | 1999 | 253.52 | 0.0394 | -1.72% | $63.03 | -10.20% |
| 9 | 1998 | 228.61 | 0.0457 | 15.47% | $62.43 | 7.38% |
| 10 | 1997 | 201.14 | 0.0492 | 18.58% | $56.62 | 17.32% |
| 11 | 1996 | 202.57 | 0.0454 | 3.83% | $60.91 | -0.48% |
| 12 | 1995 | 153.87 | 0.0584 | 37.49% | $50.22 | 29.26% |
| 13 | 1994 | 168.70 | 0.0496 | -3.83% | $60.01 | -9.65% |
| 14 | 1993 | 159.79 | 0.0537 | 10.95% | $53.13 | 20.48% |
| 15 | 1992 | 149.70 | 0.0572 | 12.46% | $49.56 | 15.27% |
| 16 | 1991 | 138.38 | 0.0607 | 14.25% | $44.84 | 19.44% |
| 17 | 1990 | 146.04 | 0.0558 | 0.33% | $45.60 | 7.11% |
| 18 | 1989 | 114.37 | 0.0699 | 34.68% | $43.06 | 15.18% |
| 19 | 1988 | 106.13 | 0.0704 | 14.80% | $40.10 | 17.36% |
| 20 | 1987 | 120.09 | 0.0588 | -5.74% | $48.92 | -9.84% |
| 21 | 1986 | 92.06 | 0.0742 | 37.87% | $39.98 | 32.36% |
| 22 | 1985 | 75.83 | 0.0860 | 30.00% | $32.57 | 35.05% |
| 23 | 1984 | 68.50 | 0.0925 | 19.95% | $31.49 | 16.12% |
| 24 | 1983 | 61.89 | 0.0948 | 20.16% | $29.41 | 20.65% |
| 25 | 1982 | 51.81 | 0.1074 | 30.20% | $24.48 | 36.48% |
| 26 | 1981 | 52.01 | 0.0978 | 9.40% | $29.37 | -3.01% |
| 27 | 1980 | 50.26 | 0.0953 | 13.01% | $34.69 | -3.81% |

| Line No. | Year | S&P Utilities Stock Price | Stock Dividend Yield | Stock Return | Bond Price | Bond Return |
|---|---|---|---|---|---|---|
| 28 | 1979 | 50.33 | 0.0893 | 8.79% | $43.91 | -11.89% |
| 29 | 1978 | 52.40 | 0.0791 | 3.96% | $49.09 | -2.40% |
| 30 | 1977 | 54.01 | 0.0714 | 4.16% | $50.95 | 4.20% |
| 31 | 1976 | 46.99 | 0.0776 | 22.70% | $43.91 | 25.13% |
| 32 | 1975 | 38.19 | 0.0920 | 32.24% | $41.76 | 14.75% |
| 33 | 1974 | 48.60 | 0.0713 | -14.29% | $52.54 | -12.91% |
| 34 | 1973 | 60.01 | 0.0556 | -13.45% | $58.51 | -3.37% |
| 35 | 1972 | 60.19 | 0.0542 | 5.12% | $56.47 | 10.69% |
| 36 | 1971 | 63.43 | 0.0504 | -0.07% | $53.93 | 12.13% |
| 37 | 1970 | 55.72 | 0.0561 | 19.45% | $50.46 | 14.81% |
| 38 | 1969 | 68.65 | 0.0445 | -14.38% | $62.43 | -12.76% |
| 39 | 1968 | 68.02 | 0.0435 | 5.28% | $66.97 | -0.81% |
| 40 | 1967 | 70.63 | 0.0392 | 0.22% | $78.69 | -9.81% |
| 41 | 1966 | 74.50 | 0.0347 | -1.72% | $86.57 | -4.48% |
| 42 | 1965 | 75.87 | 0.0315 | 1.34% | $91.40 | -0.91% |
| 43 | 1964 | 67.26 | 0.0331 | 16.11% | $92.01 | 3.68% |
| 44 | 1963 | 63.35 | 0.0330 | 9.47% | $93.56 | 2.61% |
| 45 | 1962 | 62.69 | 0.0320 | 4.25% | $89.60 | 8.89% |
| 46 | 1961 | 52.73 | 0.0358 | 22.47% | $89.74 | 4.29% |
| 47 | 1960 | 44.50 | 0.0403 | 22.52% | $84.36 | 11.13% |
| 48 | 1959 | 43.96 | 0.0377 | 5.00% | $91.55 | -3.49% |
| 49 | 1958 | 33.30 | 0.0487 | 36.88% | $101.22 | -5.60% |
| 50 | 1957 | 32.32 | 0.0487 | 7.90% | $100.70 | 4.49% |
| 51 | 1956 | 31.55 | 0.0472 | 7.16% | $113.00 | -7.35% |
| 52 | 1955 | 29.89 | 0.0461 | 10.16% | $116.77 | 0.20% |
| 53 | 1954 | 25.51 | 0.0520 | 22.37% | $112.79 | 7.07% |
| 54 | 1953 | 24.41 | 0.0511 | 9.62% | $114.24 | 2.24% |
| 55 | 1952 | 22.22 | 0.0550 | 15.36% | $113.41 | 4.26% |
| 56 | 1951 | 20.01 | 0.0606 | 17.10% | $123.44 | -4.89% |
| 57 | 1950 | 20.20 | 0.0554 | 4.60% | $125.08 | 1.89% |
| 58 | 1949 | 16.54 | 0.0570 | 27.83% | $119.82 | 7.72% |
| 59 | 1948 | 16.53 | 0.0535 | 5.41% | $118.50 | 4.49% |
| 60 | 1947 | 19.21 | 0.0354 | -10.41% | $126.02 | -2.79% |
| 61 | 1946 | 21.34 | 0.0298 | -7.00% | $126.74 | 2.59% |

| *Line No.* | *Year* | *S&P Utilities Stock Price* | *Stock Dividend Yield* | *Stock Return* | *Bond Price* | *Bond Return* |
|---|---|---|---|---|---|---|
| 62 | 1945 | 13.91 | 0.0448 | 57.89% | $119.82 | 9.11% |
| 63 | 1944 | 12.10 | 0.0569 | 20.65% | $119.82 | 3.34% |
| *64* | *1943* | *9.22* | *0.0621* | *37.45%* | *$118.50* | *4.49%* |
| 65 | 1942 | 8.54 | 0.0940 | 17.36% | $117.63 | 4.14% |
| 66 | 1941 | 13.25 | 0.0717 | -28.38% | $116.34 | 4.55% |
| 67 | 1940 | 16.97 | 0.0540 | -16.52% | $112.39 | 7.08% |
| 68 | 1939 | 16.05 | 0.0553 | 11.26% | $105.75 | 10.05% |
| 69 | 1938 | 14.30 | 0.0730 | 19.54% | $99.83 | 9.94% |
| 70 | 1937 | 24.34 | 0.0432 | -36.93% | $103.18 | 0.63% |
| 72 | Return 1937—2004 | Stocks | 10.57% | | | |
| 73 | | Bonds | 6.40% | | | |
| 74 | Risk Premium | | 4.16% | | | |

Note: See Appendix 4 for an explanation of how stock and bond returns are derived and the source of the data presented. In 2002, S&P discontinued its S&P Utilities stock index, and S&P no longer reports dividend yields for electric utilities. Thus, for this study, the utility stock returns beginning in 2002 are computed based on the companies contained in the S&P electric company index, as listed in the *S&P Security Price Record.* The dividend yields for these stocks are the January dividend yields reported by Value Line.

# PROGRESS ENERGY FLORIDA
# USING THE ARITHMETIC MEAN TO ESTIMATE THE COST OF EQUITY CAPITAL

Consider an investment that in a given year generates a return of 30 percent with probability equal to .5 and a return of -10 percent with a probability equal to .5. For each one dollar invested, the possible outcomes of this investment at the end of year one are:

| *Ending Wealth* | *Probability* |
|---|---|
| $1.30 | 0.50 |
| $0.90 | 0.50 |

At the end of year two, the possible outcomes are:

| *Ending Wealth* | | | *Probability* | *Value x Probability* |
|---|---|---|---|---|
| (1.30) (1.30) | = | $1.69 | 0.25 | 0.4225 |
| (1.30) (.9) | = | $1.17 | 0.50 | 0.5850 |
| (.9) (.9) | = | $0.81 | 0.25 | 0.2025 |
| Expected Wealth | = | | | $1.21 |

The expected value of this investment at the end of year two is $1.21. In a competitive capital market, the cost of equity is equal to the expected rate of return on an investment. In the above example, the cost of equity is that rate of return which will make the initial investment of one dollar grow to the expected value of $1.21 at the end of two years. Thus, the cost of equity is the solution to the equation:

$$1(1+k)^2 = 1.21 \text{ or}$$

$$k = (1.21/1)^{.5} - 1 = 10\%.$$

The arithmetic mean of this investment is:

$$(30\%)\ (.5) + (-10\%)\ (.5) = 10\%.$$

Thus, the arithmetic mean is equal to the cost of equity capital.

The geometric mean of this investment is:

$$[(1.3)\ (.9)]^{.5} - 1 = .082 = 8.2\%.$$

Thus, the geometric mean is not equal to the cost of equity capital.

The lesson is obvious: for an investment with an uncertain outcome, the arithmetic mean is the best measure of the cost of equity capital.

**PROGRESS ENERGY FLORIDA**
**CALCULATION OF CAPITAL ASSET PRICING MODEL COST OF EQUITY**
**USING IBBOTSON ASSOCIATES' 7.2% RISK PREMIUM**

| | | | |
|---|---|---|---|
| 1 | Risk-free Rate | 5.70% | *Blue Chip Forecasted Long-term (20-year) Treasury bond yield* |
| 2 | Beta | 0.81 | *Average Beta Proxy Companies* |
| 3 | Risk Premium | 7.20% | *Long-horizon Ibbotson risk premium* |
| 4 | Flotation Cost | 0.25% | |
| 5 | CAPM cost of equity | 11.8% | |

**PROGRESS ENERGY FLORIDA**
**CALCULATION OF CAPITAL ASSET PRICING MODEL COST OF EQUITY USING DCF ESTIMATE OF THE EXPECTED RATE OF RETURN ON THE MARKET PORTFOLIO**

| | | |
|---|---|---|
| Risk-free rate | 5.70% | *Blue Chip Forecasted Long-term Treasury bond yield* |
| Beta | 0.81 | *Average Beta Proxy Companies* |
| DCF S&P 500 | 13.15% | *DCF Cost of Equity S&P 500 (see following)* |
| Risk Premium | 7.45% | |
| Flotation Cost | 0.25% | |
| CAPM cost of equity | 12.0% | |

**Summary of Discounted Cash Flow Analysis for S&P 500 Companies**

| *Company* | $P_0$ | $d_0$ | *Growth* | *Cost of Equity* | *Market Cap $ (000,s)* |
|---|---|---|---|---|---|
| 3M | 84.52 | 1.68 | 11.4% | 13.61% | 66,189 |
| Abbott Labs. | 45.87 | 1.10 | 10.8% | 13.43% | 72,678 |
| Adobe Systems | 61.81 | 0.05 | 14.2% | 14.33% | 16,403 |
| Air Prds.& Chems. | 60.80 | 1.28 | 11.0% | 13.36% | 14,405 |
| Alberto Culver | 51.74 | 0.46 | 12.3% | 13.25% | 4,363 |
| Albertsons | 22.20 | 0.76 | 8.1% | 11.88% | 7,600 |
| Allegheny En. | 19.52 | 1.72 | 3.5% | 12.93% | 2,840 |
| Allstate | 52.29 | 1.28 | 9.1% | 11.84% | 36,718 |
| Altria Group Inco. | 64.25 | 2.92 | 8.6% | 13.59% | 135,246 |
| Ambac Financial | 78.04 | 0.50 | 14.3% | 14.98% | 8,143 |
| American Express | 54.28 | 0.48 | 12.8% | 13.77% | 64,110 |
| AmerisourceBergen | 58.55 | 0.10 | 12.2% | 12.39% | 6,365 |
| Amsouth Banc. | 25.35 | 1.00 | 8.6% | 12.90% | 9,164 |
| Anheuser-Busch Cos. | 48.75 | 0.98 | 9.0% | 11.21% | 36,820 |
| Ashland | 62.43 | 1.10 | 9.4% | 11.31% | 4,864 |
| Automatic Data Proc. | 43.25 | 0.62 | 11.3% | 12.85% | 26,210 |
| Avery Dennison | 60.08 | 1.52 | 11.2% | 14.04% | 6,841 |
| Ball | 43.23 | 0.40 | 13.0% | 14.05% | 4,557 |
| Bank Of America | 45.75 | 1.80 | 9.3% | 13.71% | 178,765 |
| Bank Of New York Co. | 30.50 | 0.80 | 11.4% | 14.39% | 22,588 |
| Baxter Intl. | 34.68 | 0.58 | 11.0% | 12.87% | 21,058 |
| BB & T | 39.77 | 1.40 | 9.8% | 13.72% | 21,434 |
| Bear Stearns | 101.21 | 1.00 | 10.8% | 11.85% | 11,318 |
| Becton Dickinson | 57.58 | 0.72 | 11.0% | 12.39% | 14,775 |
| Bemis | 29.86 | 0.72 | 10.0% | 12.68% | 3,331 |
| Boeing | 53.37 | 1.00 | 11.5% | 13.63% | 48,664 |
| Brown-Forman 'B' | 50.14 | 0.98 | 10.3% | 12.50% | 3,560 |
| Burl.Nthn.Santa Fe C | 49.57 | 0.68 | 12.1% | 13.65% | 20,273 |

| *Company* | $P_0$ | $d_0$ | *Growth* | *Cost of Equity* | *Market Cap $ (000,s)* |
|---|---|---|---|---|---|
| Capital One Finl. | 78.15 | 0.11 | 13.7% | 13.89% | 18,482 |
| Cardinal Health | 56.67 | 0.12 | 13.0% | 13.19% | 24,195 |
| Carnival | 54.47 | 0.60 | 13.7% | 14.93% | 32,619 |
| Caterpillar | 93.23 | 1.64 | 11.8% | 13.73% | 31,358 |
| Cendant | 21.89 | 0.34 | 12.8% | 14.59% | 21,625 |
| Chubb | 77.01 | 1.72 | 10.8% | 13.25% | 15,392 |
| Cincinnati Fin. | 44.59 | 1.22 | 10.3% | 13.30% | 7,294 |
| Citizens Comms. | 13.25 | 1.00 | 4.1% | 12.14% | 4,402 |
| Coca Cola | 42.10 | 1.12 | 8.7% | 11.59% | 100,428 |
| Colgate-Palm. | 52.17 | 1.16 | 9.4% | 11.81% | 27,400 |
| Comerica | 57.80 | 2.20 | 8.2% | 12.35% | 9,374 |
| Compass Bancshares | 46.34 | 1.40 | 9.8% | 13.15% | 5,610 |
| Computer Assocs.Intl. | 27.89 | 0.08 | 12.7% | 13.03% | 16,026 |
| Conagra Foods | 28.09 | 1.09 | 7.3% | 11.56% | 13,929 |
| Cooper Inds. | 69.10 | 1.48 | 10.3% | 12.67% | 6,677 |
| Costco Wholesale | 46.38 | 0.40 | 12.6% | 13.58% | 21,103 |
| Countrywide Finl. | 35.34 | 0.56 | 12.8% | 14.59% | 18,840 |
| CSX | 40.46 | 0.40 | 12.3% | 13.44% | 8,981 |
| Dana | 15.06 | 0.48 | 9.7% | 13.21% | 1,921 |
| Danaher | 54.79 | 0.06 | 14.5% | 14.63% | 16,514 |
| Darden Restaurants | 28.18 | 0.08 | 11.8% | 12.11% | 4,874 |
| Dover | 38.90 | 0.64 | 13.0% | 14.87% | 7,698 |
| Dow Chemicals | 51.47 | 1.34 | 11.6% | 14.53% | 47,535 |
| Du Pont E I De Nemours | 50.37 | 1.40 | 9.8% | 12.91% | 51,086 |
| Eaton | 68.39 | 1.24 | 11.3% | 13.28% | 10,000 |
| Ecolab | 33.09 | 0.35 | 12.2% | 13.36% | 8,486 |
| Electronic Data Systems | 21.16 | 0.20 | 13.6% | 14.64% | 10,620 |
| Eli Lilly | 55.00 | 1.52 | 10.8% | 13.89% | 59,015 |
| Engelhard | 29.86 | 0.48 | 10.8% | 12.54% | 3,669 |
| Family Dollar Stores | 32.30 | 0.38 | 12.8% | 14.09% | 5,092 |
| Fannie Mae | 61.95 | 1.04 | 10.2% | 12.03% | 52,702 |
| Federated Invrs.'B' | 29.16 | 0.50 | 10.0% | 11.90% | 3,026 |
| First Data | 40.55 | 0.24 | 13.6% | 14.25% | 31,522 |
| First Horizon National | 42.79 | 1.72 | 8.4% | 12.87% | 5,054 |
| Fluor | 56.32 | 0.64 | 12.6% | 13.92% | 4,742 |

| *Company* | $P_0$ | $d_0$ | *Growth* | *Cost of Equity* | *Market Cap $ (000,s)* |
|---|---|---|---|---|---|
| Frank.Res. | 68.91 | 0.40 | 12.1% | 12.77% | 17,189 |
| Freddie Mac | 65.91 | 1.40 | 11.5% | 13.89% | 43,856 |
| Gap | 21.49 | 0.18 | 13.9% | 14.84% | 18,750 |
| General Electric | 35.84 | 0.88 | 10.7% | 13.47% | 382,233 |
| General Mills | 51.42 | 1.24 | 8.7% | 11.29% | 17,944 |
| General Motors | 35.62 | 2.00 | 5.3% | 11.37% | 16,600 |
| Gillette | 49.33 | 0.65 | 11.1% | 12.60% | 50,042 |
| Golden West Finl. | 61.85 | 0.24 | 12.6% | 13.00% | 18,569 |
| Goldman Sachs Gp. | 108.61 | 1.00 | 13.0% | 14.06% | 53,049 |
| Grainger W W | 63.48 | 0.80 | 12.5% | 13.92% | 5,646 |
| Guidant | 72.93 | 0.40 | 13.9% | 14.49% | 23,840 |
| H & R Block | 50.04 | 0.88 | 11.8% | 13.73% | 8,359 |
| Hartford Finl.Svs.Gp. | 69.68 | 1.16 | 11.4% | 13.24% | 20,274 |
| Hasbro | 20.03 | 0.36 | 10.3% | 12.33% | 3,631 |
| HCA | 46.25 | 0.60 | 12.0% | 13.42% | 24,762 |
| Health Man.As.A | 23.71 | 0.16 | 13.7% | 14.48% | 6,388 |
| Heinz Hj | 37.49 | 1.14 | 8.0% | 11.32% | 12,896 |
| Hershey Foods | 59.50 | 0.88 | 10.2% | 11.84% | 11,184 |
| Hewlett-Packard | 20.61 | 0.32 | 10.8% | 12.56% | 63,528 |
| Hilton Hotels | 22.17 | 0.08 | 13.4% | 13.81% | 8,598 |
| Home Depot | 40.52 | 0.40 | 13.1% | 14.20% | 83,973 |
| Honeywell Intl. | 36.81 | 0.82 | 11.5% | 13.99% | 31,657 |
| Illinois Tool Wks. | 90.04 | 1.12 | 13.4% | 14.86% | 26,166 |
| IMS Health | 23.64 | 0.08 | 12.0% | 12.34% | 5,546 |
| Ingersoll-Rand | 80.16 | 1.00 | 12.1% | 13.55% | 13,818 |
| Intl.Bus.Mach. | 93.31 | 0.72 | 10.5% | 11.30% | 165,787 |
| ITT Industries | 86.78 | 0.72 | 12.3% | 13.18% | 8,327 |
| Janus Capital Gp. | 14.75 | 0.04 | 11.8% | 12.08% | 3,222 |
| Jefferson Pilot | 49.33 | 1.67 | 8.1% | 11.84% | 6,700 |
| Johnson & Johnson | 65.40 | 1.14 | 11.3% | 13.24% | 199,711 |
| Johnson Controls | 59.12 | 1.00 | 12.9% | 14.81% | 10,660 |
| Jones Apparel Group | 33.78 | 0.40 | 10.8% | 12.10% | 4,100 |
| JP Morgan Chase & Co. | 37.05 | 1.36 | 10.6% | 14.73% | 123,261 |
| Keycorp | 32.73 | 1.30 | 7.6% | 11.93% | 13,185 |
| Lehman Bros.Hdg. | 90.95 | 0.80 | 13.0% | 13.98% | 26,007 |
| Limited Brands | 23.69 | 0.60 | 11.9% | 14.75% | 9,876 |

| *Company* | $P_0$ | $d_0$ | *Growth* | *Cost of Equity* | *Market Cap $ (000,s)* |
|---|---|---|---|---|---|
| Lincoln Nat. | 46.60 | 1.46 | 11.1% | 14.63% | 7,870 |
| Liz Claiborne | 41.60 | 0.22 | 11.2% | 11.76% | 4,375 |
| Lockheed Martin | 58.07 | 1.00 | 11.4% | 13.32% | 26,936 |
| M&T Bk. | 102.14 | 1.60 | 10.0% | 11.73% | 11,745 |
| Marriott Intl.'A' | 64.35 | 0.34 | 14.3% | 14.87% | 14,951 |
| Marsh & Mclennan | 31.24 | 0.68 | 10.5% | 12.92% | 16,090 |
| Marshall & Ilsley | 41.93 | 0.84 | 10.2% | 12.39% | 9,498 |
| Mattel | 20.19 | 0.45 | 10.1% | 12.54% | 8,896 |
| MBIA | 58.68 | 1.12 | 12.4% | 14.56% | 7,195 |
| MBNA | 26.27 | 0.56 | 12.3% | 14.75% | 31,367 |
| McGraw-Hill | 91.40 | 1.32 | 11.7% | 13.36% | 16,602 |
| McKesson | 35.18 | 0.24 | 13.9% | 14.68% | 11,144 |
| Mellon Finl. | 29.36 | 0.72 | 10.9% | 13.65% | 12,088 |
| Merck & Co. | 30.66 | 1.52 | 6.3% | 11.64% | 71,475 |
| Meredith | 48.34 | 0.56 | 12.6% | 13.94% | 1,887 |
| Merrill Lynch & Co. | 58.99 | 0.64 | 11.9% | 13.12% | 54,014 |
| Metlife | 40.26 | 0.46 | 10.7% | 11.95% | 28,657 |
| MGIC Invt | 63.92 | 0.30 | 11.9% | 12.41% | 5,887 |
| Microsoft | 25.66 | 0.32 | 10.9% | 12.31% | 262,975 |
| Molson Coors Brewing 'B' | 73.43 | 1.28 | 12.0% | 13.97% | 3,970 |
| Moodys | 84.60 | 0.22 | 14.8% | 15.05% | 12,056 |
| Morgan Stanley | 56.85 | 1.08 | 12.6% | 14.75% | 62,257 |
| Motorola | 15.91 | 0.16 | 12.2% | 13.36% | 36,684 |
| Mylan Laboratories | 17.12 | 0.12 | 12.5% | 13.28% | 4,771 |
| Nat.City | 35.57 | 1.40 | 7.6% | 11.91% | 21,666 |
| New York Times 'A' | 37.97 | 0.62 | 9.9% | 11.70% | 5,303 |
| Newell Rubbermaid | 22.26 | 0.84 | 9.3% | 13.51% | 6,029 |
| Nike 'B' | 86.10 | 1.00 | 13.6% | 14.92% | 15,536 |
| Nordstrom | 50.70 | 0.52 | 13.1% | 14.29% | 7,757 |
| North Fork Bancorp. | 28.60 | 0.88 | 10.3% | 13.70% | 13,186 |
| Northern Trust | 44.24 | 0.84 | 11.8% | 13.90% | 9,500 |
| Northrop Grumman | 53.32 | 1.04 | 9.3% | 11.45% | 19,447 |
| Omnicom Gp. | 87.22 | 0.90 | 11.8% | 12.95% | 16,356 |
| Pall | 27.02 | 0.40 | 10.7% | 12.32% | 3.375 |
| Penney Jc | 44.80 | 0.50 | 10.0% | 11.20% | 14,829 |

| *Company* | $P_0$ | $d_0$ | *Growth* | *Cost of Equity* | *Market Cap $ (000,s)* |
|---|---|---|---|---|---|
| Pepsico | 53.40 | 0.92 | 10.7% | 12.64% | 88,993 |
| Pfizer | 25.94 | 0.76 | 8.5% | 11.66% | 195,944 |
| Pnc Finl.Svs.Gp. | 53.65 | 2.00 | 7.5% | 11.56% | 14,568 |
| Praxair | 44.55 | 0.72 | 10.3% | 12.12% | 15,429 |
| Principal Finl.Gp. | 39.71 | 0.55 | 12.3% | 13.88% | 11,529 |
| Procter & Gamble | 53.40 | 1.00 | 10.9% | 12.98% | 133,697 |
| Progressive Ohio | 86.81 | 0.12 | 11.1% | 11.20% | 18,361 |
| Prudential Finl. | 56.10 | 0.63 | 12.6% | 13.84% | 30,078 |
| Pulte Homes | 70.58 | 0.20 | 13.0% | 13.32% | 9,483 |
| Radioshack | 30.21 | 0.25 | 11.9% | 12.86% | 3,868 |
| Reebok Intl. | 44.12 | 0.30 | 13.7% | 14.44% | 2,640 |
| Regions Finl.New | 33.07 | 1.36 | 9.0% | 13.55% | 15,053 |
| Reynolds American | 81.59 | 3.80 | 6.8% | 11.86% | 11,879 |
| Rockwell Collins | 44.09 | 0.48 | 12.4% | 13.63% | 8,489 |
| Rohm & Haas | 45.93 | 1.00 | 9.7% | 12.08% | 10,852 |
| Sabre Hdg. | 21.22 | 0.36 | 11.0% | 12.90% | 2,878 |
| Safeco | 48.30 | 0.88 | 10.2% | 12.24% | 6,195 |
| SBC Communications | 24.24 | 1.29 | 6.0% | 11.74% | 78,258 |
| Sherwin-Williams | 44.48 | 0.82 | 11.5% | 13.57% | 6,179 |
| Sigma Aldrich | 61.78 | 0.76 | 10.0% | 11.36% | 4,217 |
| SLM | 50.35 | 0.76 | 13.4% | 15.08% | 21,015 |
| Sovereign Banc. | 22.64 | 0.16 | 11.0% | 11.79% | 8,293 |
| St.Paul Travelers | 37.58 | 0.88 | 9.8% | 12.44% | 24,589 |
| State Street | 44.96 | 0.68 | 12.1% | 13.82% | 14,582 |
| Suntrust Banks | 72.07 | 2.20 | 8.9% | 12.27% | 26,005 |
| T Rowe Price Gp. | 60.46 | 0.92 | 12.7% | 14.39% | 7,736 |
| Tektronix | 28.32 | 0.24 | 14.0% | 14.97% | 2,192 |
| Textron | 74.28 | 1.40 | 11.8% | 13.95% | 10,262 |
| Tiffany & Co | 31.58 | 0.24 | 12.5% | 13.36% | 5,023 |
| Tjx Cos. | 24.79 | 0.18 | 14.1% | 14.94% | 11,840 |
| Torchmark | 53.76 | 0.44 | 10.4% | 11.27% | 5,553 |
| Union Pacific | 63.48 | 1.20 | 10.0% | 12.09% | 18,192 |
| United Technologies | 101.30 | 1.76 | 11.3% | 13.29% | 52,027 |
| Unumprovident | 17.36 | 0.30 | 9.4% | 11.30% | 5,065 |
| US Bancorp | 29.90 | 1.20 | 10.3% | 14.80% | 53,811 |
| UST | 51.98 | 2.20 | 7.3% | 11.95% | 8,547 |

| *Company* | $P_0$ | $d_0$ | *Growth* | *Cost of Equity* | *Market Cap $ (000,s)* |
|---|---|---|---|---|---|
| Viacom 'B' | 36.69 | 0.28 | 12.6% | 13.47% | 52,113 |
| Wachovia | 52.91 | 1.84 | 10.0% | 13.87% | 80,746 |
| Walt Disney | 28.33 | 0.24 | 13.7% | 14.63% | 58,821 |
| Washington Mutual | 41.04 | 1.84 | 9.6% | 14.56% | 34,730 |
| Waste Man. | 29.41 | 0.80 | 11.6% | 14.67% | 16,400 |
| Wendy's Intl. | 38.78 | 0.54 | 12.2% | 13.77% | 4,450 |
| Wrigley William Jr. | 67.84 | 1.12 | 10.6% | 12.44% | 12,546 |
| Yum! Brands | 48.16 | 0.40 | 11.1% | 12.00% | 15,096 |
| Zions Bancorp. | 67.37 | 1.44 | 10.7% | 13.12% | 6,202 |
| Market-Weighted Average | | | | 13.15% | |

Notes: In applying the DCF model to the S&P 500, I included in the DCF analysis only those companies in the S&P 500 group which pay a dividend, have a positive growth rate, and have at least three analysts' long-term growth estimates. I also eliminated those 25% of companies with the highest and lowest DCF results.

$d_o$ = Current dividend per Thomson Financial.

$P_0$ = Average of the monthly high and low stock prices during the three months ending March 2005 per Thomson Financial.

g = I/B/E/S forecast of future earnings growth March 2005.

k = Cost of equity using the quarterly version of the DCF model shown below:

$$k = \left[ \frac{d_0 (1+g)^{\frac{1}{4}}}{P_0} \right]^4 - 1$$

**PROGRESS ENERGY FLORIDA**
**APPENDIX 1**
**DERIVATION OF THE QUARTERLY DCF MODEL**

The simple DCF model assumes that a firm pays dividends only at the end of each year. Since firms in fact pay dividends quarterly and investors appreciate the time value of money, the annual version of the DCF model generally underestimates the value investors are willing to place on the firm's expected future dividend stream. In these workpapers, we review two alternative formulations of the DCF model that allow for the quarterly payment of dividends.

When dividends are assumed to be paid annually, the DCF model suggests that the current price of the firm's stock is given by the expression:

$$P_0 = \frac{D_1}{(1+k)} + \frac{D_2}{(1+k)^2} + \ldots + \frac{D_n + P_n}{(1+k)^n} \quad (1)$$

where

| | | |
|---|---|---|
| $P_0$ | = | current price per share of the firm's stock, |
| $D_1, D_2, \ldots, D_n$ | = | expected annual dividends per share on the firm's stock, |
| $P_n$ | = | price per share of stock at the time investors expect to sell the stock, and |
| k | = | return investors expect to earn on alternative investments of the same risk, i.e., the investors' required rate of return. |

Unfortunately, expression (1) is rather difficult to analyze, especially for the purpose of estimating k. Thus, most analysts make a number of simplifying assumptions. First, they

assume that dividends are expected to grow at the constant rate g into the indefinite future. Second, they assume that the stock price at time n is simply the present value of all dividends expected in periods subsequent to n. Third, they assume that the investors' required rate of return, k, exceeds the expected dividend growth rate g. Under the above simplifying assumptions, a firm's stock price may be written as the following sum:

$$P_0 = \frac{D_0(1+g)}{(1+k)} + \frac{D_0(1+g)^2}{(1+k)^2} + \frac{D_0(1+g)^3}{(1+k)^3} + \cdots, \qquad (2)$$

where the three dots indicate that the sum continues indefinitely.

As we shall demonstrate shortly, this sum may be simplified to:

$$P_0 = \frac{D_0(1+g)}{(k-g)}$$

First, however, we need to review the very useful concept of a geometric progression.

Geometric Progression

Consider the sequence of numbers 3, 6, 12, 24,..., where each number after the first is obtained by multiplying the preceding number by the factor 2. Obviously, this sequence of numbers may also be expressed as the sequence 3, 3 x 2, 3 x $2^2$, 3 x $2^3$, etc. This sequence is an example of a geometric progression.

Definition: A geometric progression is a sequence in which each term after the first is obtained by multiplying some fixed number, called the common ratio, by the preceding term.

A general notation for geometric progressions is: a, the first term, r, the common ratio, and n, the number of terms. Using this notation, any geometric progression may be represented by the sequence:

$$a, ar, ar^2, ar^3, \ldots, ar^{n-1}.$$

In studying the DCF model, we will find it useful to have an expression for the sum of n terms of a geometric progression. Call this sum $S_n$. Then

$$S_n = a + ar + \ldots + ar^{n-1} . \qquad (3)$$

However, this expression can be simplified by multiplying both sides of equation (3) by r and then subtracting the new equation from the old. Thus,

$$rS_n = ar + ar^2 + ar^3 + \ldots + ar^n$$

and

$$S_n - rS_n = a - ar^n ,$$

or

$$(1 - r)\, S_n = a\,(1 - r^n) .$$

Solving for $S_n$, we obtain:

$$S_n = \frac{a(1 - r^n)}{(1 - r)} \qquad (4)$$

as a simple expression for the sum of n terms of a geometric progression. Furthermore, if $|r| < 1$, then $S_n$ is finite, and as n approaches infinity, $S_n$ approaches a ÷ (1-r). Thus, for a geometric progression with an infinite number of terms and $|r| < 1$, equation (4) becomes:

$$S = \frac{a}{1-r} \qquad (5)$$

Application to DCF Model

Comparing equation (2) with equation (3), we see that the firm's stock price (under the DCF assumption) is the sum of an infinite geometric progression with the first term

$$a = \frac{D_0(1+g)}{(1+k)}$$

and common factor

$$r = \frac{(1+g)}{(1+k)}$$

Applying equation (5) for the sum of such a geometric progression, we obtain

$$S = a \bullet \frac{1}{(1-r)} = \frac{D_0(1+g)}{(1+k)} \bullet \frac{1}{1-\frac{1+g}{1+k}} = \frac{D_0(1+g)}{(1+k)} \bullet \frac{1+k}{k-g} = \frac{D_0(1+g)}{k-g}$$

as we suggested earlier.

**Quarterly DCF Model**

The annual DCF model assumes that dividends grow at an annual rate of g% per year (see Figure 1).

Figure 1

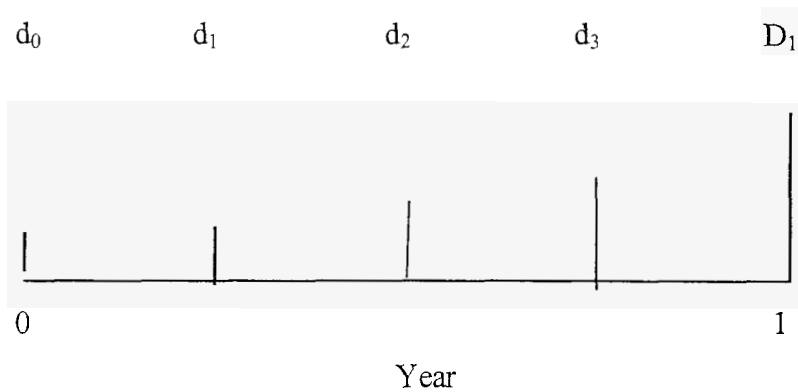
Annual DCF Model


$D_0 = 4d_0$

$D_1 = D_0(1 + g)$

Figure 2

Quarterly DCF Model (Constant Growth Version)




$d_1 = d_0(1+g)^{.25}$ $d_2 = d_0(1+g)^{.50}$

$d_3 = d_0(1+g)^{.75}$ $d_4 = d_0(1+g)$

In the quarterly DCF model, it is natural to assume that quarterly dividend payments differ from the preceding quarterly dividend by the factor $(1 + g)^{.25}$, where g is expressed in terms of percent per year and the decimal .25 indicates that the growth has only occurred for one quarter of the year. (See Figure 2.) Using this assumption, along with the assumption of constant growth and $\boldsymbol{k} > \boldsymbol{g}$, we obtain a new expression for the firm's stock price, which takes account of the quarterly payment of dividends. This expression is:

$$P_0 = \frac{d_0(1+g)^{\frac{1}{4}}}{(1+k)^{\frac{1}{4}}} + \frac{d_0(1+g)^{\frac{2}{4}}}{(1+k)^{\frac{2}{4}}} + \frac{d_0(1+g)^{\frac{3}{4}}}{(1+k)^{\frac{3}{4}}} + \ldots \qquad (6)$$

where $d_0$ is the last quarterly dividend payment, rather than the last annual dividend payment. (We use a lower case d to remind the reader that this is not the annual dividend.)

Although equation (6) looks formidable at first glance, it too can be greatly simplified using the formula [equation (4)] for the sum of an infinite geometric progression. As the reader can easily verify, equation (6) can be simplified to:

$$P_0 = \frac{d_0(1+g)^{\frac{1}{4}}}{(1+k)^{\frac{1}{4}} - (1+g)^{\frac{1}{4}}} \quad (7)$$

Solving equation (7) for $k$, we obtain a DCF formula for estimating the cost of equity under the quarterly dividend assumption:

$$k = \left[ \frac{d_0(1+g)^{\frac{1}{4}}}{P_0} + (1+g)^{\frac{1}{4}} \right]^4 - 1 \quad (8)$$

An Alternative Quarterly DCF Model

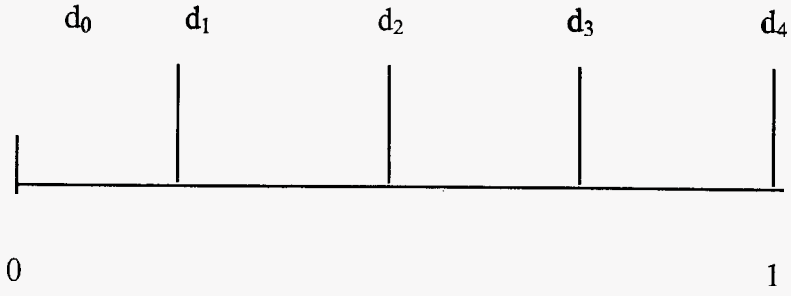
Although the constant growth quarterly DCF model [equation (8)] allows for the quarterly timing of dividend payments, it does require the assumption that the firm increases its dividend payments each quarter. Since this assumption is difficult for some analysts to accept, we now discuss a second quarterly DCF model that allows for constant quarterly dividend payments within each dividend year.

Assume then that the firm pays dividends quarterly and that each dividend payment is constant for four consecutive quarters. There are four cases to consider, with each case distinguished by varying assumptions about where we are evaluating the firm in relation to the time of its next dividend increase. (See Figure 3.)

**Figure 3**

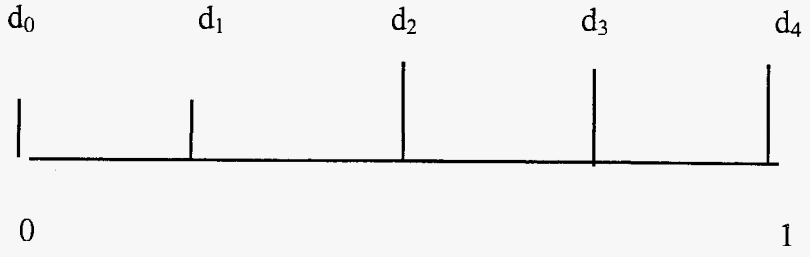
**Quarterly DCF Model (Constant Dividend Version)**

**Case 1**




$$d_1 = d_2 = d_3 = d_4 = d_0(1+g)$$

**Case 2**

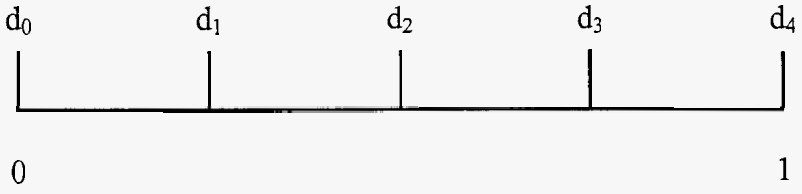



$$d_1 = d_0$$

$$d_2 = d_3 = d_4 = d_0(1+g)$$

**Figure 3 (continued)**

**Case 3**

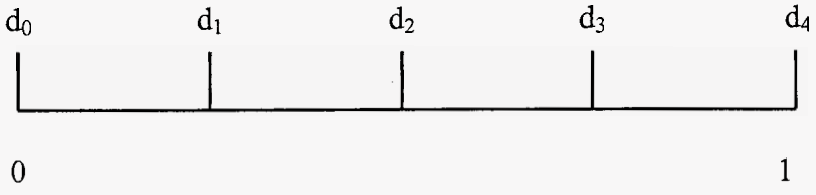



Year

$d_1 = d_2 = d_0$

$d_3 = d_4 = d_0(1+g)$

**Case 4**




Year

$d_1 = d_2 = d_3 = d_0$

$d_4 = d_0(1+g)$

If we assume that the investor invests the quarterly dividend in an alternative investment of the same risk, then the amount accumulated by the end of the year will in all cases be given by

$$D_1^* = d_1 (1+k)^{3/4} + d_2 (1+k)^{1/2} + d_3 (1+k)^{1/4} + d_4$$

where $d_1$, $d_2$, $d_3$ and $d_4$ are the four quarterly dividends. Under these new assumptions, the firm's stock price may be expressed by an annual DCF model of the form (2), with the exception that

$$D_1^* = d_1 (1+k)^{3/4} + d_2 (1+k)^{1/2} + d_3 (1+k)^{1/4} + d_4 \qquad (9)$$

is used in place of $D_0(1+g)$. But, we already know that the annual DCF model may be reduced to

$$P_0 = \frac{D_0(1+g)}{k-g}$$

Thus, under the assumptions of the second quarterly DCF model, the firm's cost of equity is given by

$$k = \frac{D_1^*}{P_0} + g \qquad (10)$$

with $D_1^*$ given by (9).

Although equation (10) looks like the annual DCF model, there are at least two very important practical differences. First, since $D_1^*$ is always greater than $D_0(1+g)$, the estimates of the cost of equity are always larger (and more accurate) in the quarterly model (10) than in the annual model. Second, since $D_1^*$ depends on k through equation (9), the unknown "k" appears on both sides of (10), and an iterative procedure is required to solve for k.

# PROGRESS ENERGY FLORIDA
# APPENDIX 2
# ADJUSTING FOR FLOTATION COSTS IN DETERMINING A PUBLIC UTILITY'S ALLOWED RATE OF RETURN ON EQUITY

## A. Introduction

Regulation of public utilities is guided by the principle that utility revenues should be sufficient to allow recovery of all prudently incurred expenses, including the cost of capital. As set forth in the 1944 *Hope Natural Gas* Case [*Federal Power Comm'n v. Hope Natural Gas Co.* 320 U. S. 591 (1944) at 603], the U. S. Supreme Court states:

> From the investor or company point of view it is important that there be enough revenue not only for operating expenses but also for the capital costs of the business. These include service on the debt and dividends on the stock....By that standard the return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks.

Since the flotation costs arising from the issuance of debt and equity securities are an integral component of capital costs, this standard requires that the company's revenues be sufficient to fully recover flotation costs.

Despite the widespread agreement that flotation costs should be recovered in the regulatory process, several issues still need to be resolved. These include:

1. How is the term "flotation costs" defined? Does it include only the out-of-pocket costs associated with issuing securities (e. g., legal fees, printing costs, selling and underwriting expenses), or does it also include the reduction in a security's price that frequently accompanies flotation (i. e., market pressure)?

2. What should be the time pattern of cost recovery? Should a company be allowed to recover flotation costs immediately, or should flotation costs be recovered over the life of the issue?

3. For the purposes of regulatory accounting, should flotation costs be included as an expense? As an addition to rate base? Or as an additional element of a firm's allowed rate of return?

4. Do existing regulatory methods for flotation cost recovery allow a firm ***full*** recovery of flotation costs?

In this paper, I review the literature pertaining to the above issues and discuss my own views regarding how this literature applies to the cost of equity for a regulated firm.

## B. Definition of Flotation Cost

The value of a firm is related to the future stream of net cash flows (revenues minus expenses measured on a cash basis) that can be derived from its assets. In the process of acquiring assets, a firm incurs certain expenses which reduce its value. Some of these expenses or costs are directly associated with revenue production in one period (e. g., wages, cost of goods sold), others are more properly associated with revenue production in many periods (e. g., the acquisition cost of plant and equipment). In either case, the word "cost" refers to any item that reduces the value of a firm.

If this concept is applied to the act of issuing new securities to finance asset purchases, many items are properly included in issuance or flotation costs. These include: (1) compensation received by investment bankers for underwriting services, (2) legal fees, (3) accounting fees, (4) engineering fees, (5) trustee's fees, (6) listing fees, (7) printing and engraving expenses, (8) SEC registration fees, (9) Federal Revenue Stamps, (10) state taxes, (11) warrants granted to underwriters as extra

compensation, (12) postage expenses, (13) employees' time, (14) market pressure, and (15) the offer discount. The finance literature generally divides these flotation cost items into three categories, namely, underwriting expenses, issuer expenses, and price effects.

## C. Magnitude of Flotation Costs

The finance literature contains several studies of the magnitude of the flotation costs associated with new debt and equity issues. These studies differ primarily with regard to the time period studied, the sample of companies included, and the source of data. The flotation cost studies generally agree, however, that for large issues, underwriting expenses represent approximately one and one-half percent of the proceeds of debt issues and three to five percent of the proceeds of seasoned equity issues. They also agree that issuer expenses represent approximately 0.5 percent of both debt and equity issues, and that the announcement of an equity issue reduces the company's stock price by at least two to three percent of the proceeds from the stock issue. Thus, total flotation costs represent approximately two percent[5] of the proceeds from debt issues, and five and one-half to eight and one-half percent of the proceeds of equity issues.

Lee *et. al.* [14] is an excellent example of the type of flotation cost studies found in the finance literature. The Lee study is a comprehensive recent study of the underwriting and issuer costs associated with debt and equity issues for both utilities and non-utilities. The results of the Lee *et. al.* study are reproduced in Tables 1 and 2. Table 1 demonstrates that the total underwriting and issuer expenses for the 1,092 debt issues in their study averaged 2.24 percent of the proceeds of the issues, while

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[5] The two percent flotation cost on debt only recognizes the cost of newly-issued debt. When interest rates decline, many companies exercise the call provisions on higher cost debt and reissue debt at lower rates. This process involves reacquisition costs that are not included in the academic studies. If reacquisition costs were included in the academic studies, debt flotation costs could increase significantly.

the total underwriting and issuer costs for the 1,593 seasoned equity issues in their study averaged 7.11 percent of the proceeds of the new issue. Table 1 also demonstrates that the total underwriting and issuer costs of seasoned equity offerings, as a percent of proceeds, decline with the size of the issue. For issues above $60 million, total underwriting and issuer costs amount to from three to five percent of the amount of the proceeds.

Table 2 reports the total underwriting and issuer expenses for 135 utility debt issues and 136 seasoned utility equity issues. Total underwriting and issuer expenses for utility bond offerings averaged 1.47 percent of the amount of the proceeds and for seasoned utility equity offerings averaged 4.92 percent of the amount of the proceeds. Again, there are some economies of scale associated with larger equity offerings. Total underwriting and issuer expenses for equity offerings in excess of 40 million dollars generally range from three to four percent of the proceeds.

The results of the Lee study for large equity issues are consistent with results of earlier studies by Bhagat and Frost [4], Mikkelson and Partch [17], and Smith [24]. Bhagat and Frost found that total underwriting and issuer expenses average approximately four and one-half percent of the amount of proceeds from negotiated utility offerings during the period 1973 to 1980, and approximately three and one-half percent of the amount of the proceeds from competitive utility offerings over the same period. Mikkelson and Partch found that total underwriting and issuer expenses average five and one-half percent of the proceeds from seasoned equity offerings over the 1972 to 1982 period. Smith found that total underwriting and issuer expenses for larger equity issues generally amount to four to five percent of the proceeds of the new issue.

The finance literature also contains numerous studies of the decline in price associated with sales of large blocks of stock to the public. These articles relate to the price impact of: (1) initial public offerings; (2) the sale of large blocks of stock from one investor to another; and (3) the issuance of seasoned equity issues to the general public. All of these studies generally support the notion that the announcement of the sale of large blocks of stock produces a decline in a company's share price. The decline in share price for initial public offerings is significantly larger than the decline in share price for seasoned equity offerings; and the decline in share price for public utilities is less than the decline in share price for non-public utilities. A comprehensive study of the magnitude of the decline in share price associated specifically with the sale of new equity by public utilities is reported in Pettway [19], who found the market pressure effect for a sample of 368 public utility equity sales to be in the range of two to three percent. This decline in price is a real cost to the utility, because the proceeds to the utility depend on the stock price on the day of issue.

In addition to the price decline associated with the announcement of a new equity issue, the finance literature recognizes that there is also a price decline associated with the actual issuance of equity securities. In particular, underwriters typically sell seasoned new equity securities to investors at a price lower than the closing market price on the day preceding the issue. The Rules of Fair Practice of the National Association of Securities Dealers require that underwriters not sell shares at a price above the offer price. Since the offer price represents a binding constraint to the underwriter, the underwriter tends to set the offer price slightly below the market price on the day of issue to compensate for the risk that the price received by the underwriter may go down, but can not increase. Smith provides evidence that the offer discount tends to be between 0.5 and 0.8 percent of the proceeds of an equity issue. I am not aware of any similar studies for debt issues.

In summary, the finance literature provides strong support for the conclusion that total underwriting and issuer expenses for public utility debt offerings represent approximately two percent of the amount of the proceeds, while total underwriting and issuer expenses for public utility equity offerings represent at least four to five percent of the amount of the proceeds. In addition, the finance literature supports the conclusion that the cost associated with the decline in stock price at the announcement date represents approximately two to three percent as a result of a large public utility equity issue.

**D. Time Pattern Of Flotation Cost Recovery**

Although flotation costs are incurred only at the time a firm issues new securities, there is no reason why an issuing firm ought to recognize the expense only in the current period. In fact, if assets purchased with the proceeds of a security issue produce revenues over many years, a sound argument can be made in favor of recognizing flotation expenses over a reasonably lengthy period of time. Such recognition is certainly consistent with the generally accepted accounting principle that the time pattern of expenses match the time pattern of revenues, and it is also consistent with the normal treatment of debt flotation expenses in both regulated and unregulated industries.

In the context of a regulated firm, it should be noted that there are many possible time patterns for the recovery of flotation expenses. However, if it is felt that flotation expenses are most appropriately recovered over a period of years, then it should be recognized that investors must also be compensated for the passage of time. That is to say, the value of an investor's capital will be reduced if the expenses are merely distributed over time, without any allowance for the time value of money.

**E. Accounting For Flotation Cost In A Regulatory Setting**

In a regulatory setting, a firm's revenue requirements are determined by the equation:

*Revenue Requirement = Total Expenses + Allowed Rate of Return x Rate Base*

Thus, there are three ways in which an issuing firm can account for and recover its flotation expenses: (1) treat flotation expenses as a current expense and recover them immediately; (2) include flotation expenses in rate base and recover them over time; and (3) adjust the allowed rate of return upward and again recover flotation expenses over time. Before considering methods currently being used to recover flotation expenses in a regulatory setting, I shall briefly consider the advantages and disadvantages of these three basic recovery methods.

**Expenses**. Treating flotation costs as a current expense has several advantages. Because it allows for recovery at the time the expense occurs, it is not necessary to compute amortized balances over time and to debate which interest rate should be applied to these balances. A firm's stockholders are treated fairly, and so are the firm's customers, because they pay neither more nor less than the actual flotation expense. Since flotation costs are relatively small compared to the total revenue requirement, treatment as a current expense does not cause unusual rate hikes in the year of flotation, as would the introduction of a large generating plant in a state that does not allow Construction Work in Progress in rate base.

On the other hand, there are two major disadvantages of treating flotation costs as a current expense. First, since the asset purchased with the acquired funds will likely generate revenues for many years into the future, it seems unfair that current ratepayers should bear the full cost of issuing new securities, when future ratepayers share in the benefits. Second, this method requires an estimate of the underpricing effect on each security issue. Given the difficulties involved in measuring the extent

of underpricing, it may be more accurate to estimate the average underpricing allowance for many securities than to estimate the exact figure for one security.

**Rate Base**. In an article in *Public Utilities Fortnightly*, Bierman and Hass [5] recommend that flotation costs be treated as an intangible asset that is included in a firm's rate base along with the assets acquired with the stock proceeds. This approach has many advantages. For ratepayers, it provides a better match between benefits and expenses: the future ratepayers who benefit from the financing costs contribute the revenues to recover these costs. For investors, if the allowed rate of return is equal to the investors' required rate of return, it is also theoretically fair since they are compensated for the opportunity cost of their investment (including both the time value of money and the investment risk).

Despite the compelling advantages of this method of cost recovery, there are several disadvantages that probably explain why it has not been used in practice. First, a firm will only recover the proper amount for flotation expenses if the rate base is multiplied by the appropriate cost of capital. To the extent that a commission under or over estimates the cost of capital, a firm will under or over recover its flotation expenses. Second, it is may be both legally and psychologically difficult for commissioners to include an intangible asset in a firm's rate base. According to established legal doctrine, assets are to be included in rate base only if they are "used and useful" in the public service. It is unclear whether intangible assets such as flotation expenses meet this criterion.

**Rate of Return**. The prevailing practice among state regulators is to treat flotation expenses as an additional element of a firm's cost of capital or allowed rate of return. This method is similar to the second method above (treatment in rate base) in that some part of the initial flotation cost is amortized over time. However, it has a

disadvantage not shared by the rate base method. If flotation cost is included in rate base, it is fairly easy to keep track of the flotation cost on each new equity issue and see how it is recovered over time. Using the rate of return method, it is not possible to track the flotation cost for specific issues because the flotation cost for a specific issue is never recorded. Thus, it is not clear to participants whether a current allowance is meant to recover (1) flotation costs actually incurred in a test period, (2) expected future flotation costs, or (3) past flotation costs. This confusion never arises in the treatment of debt flotation costs. Because the exact costs are recorded and explicitly amortized over time, participants recognize that current allowances for debt flotation costs are meant to recover some fraction of the flotation costs on all past debt issues.

**F. Existing Regulatory Methods**

Although most state commissions prefer to let a regulated firm recover flotation expenses through an adjustment to the allowed rate of return, there is considerable controversy about the magnitude of the required adjustment. The following are some of the most frequently asked questions: (1) Should an adjustment to the allowed return be made every year, or should the adjustment be made only in those years in which new equity is raised? (2) Should an adjusted rate of return be applied to the entire rate base, or should it be applied only to that portion of the rate base financed with paid-in capital (as opposed to retained earnings)? (3) What is the appropriate formula for adjusting the rate of return?

This section reviews several methods of allowing for flotation cost recovery. Since the regulatory methods of allowing for recovery of debt flotation costs is well known and widely accepted, I will begin my discussion of flotation cost recovery procedures by describing the widely accepted procedure of allowing for debt flotation cost recovery.

**Debt Flotation Costs**

Regulators uniformly recognize that companies incur flotation costs when they issue debt securities. They typically allow recovery of debt flotation costs by making an adjustment to both the cost of debt and the rate base (see Brigham [6]). Assume that: (1) a regulated company issues $100 million in bonds that mature in 10 years; (2) the interest rate on these bonds is seven percent; and (3) flotation costs represent four percent of the amount of the proceeds. Then the cost of debt for regulatory purposes will generally be calculated as follows:

$$\text{Cost of Debt} = \frac{\text{Interest expense} + \text{Amortization of flotation costs}}{\text{Principal value} - \text{Unamortized flotation costs}}$$
$$= \frac{\$7{,}000{,}000 + \$400{,}000}{\$100{,}000{,}000 - \$4{,}000{,}000}$$
$$= 7.71\%$$

Thus, current regulatory practice requires that the cost of debt be adjusted upward by approximately 71 basis points, in this example, to allow for the recovery of debt flotation costs. This example does not include losses on reacquisition of debt. The flotation cost allowance would increase if losses on reacquisition of debt were included.

The logic behind the traditional method of allowing for recovery of debt flotation costs is simple. Although the company has issued $100 million in bonds, it can only invest $96 million in rate base because flotation costs have reduced the amount of funds received by $4 million. If the company is not allowed to earn a 71 basis point higher rate of return on the $96 million invested in rate base, it will not generate sufficient cash flow to pay the seven percent interest on the $100 million in bonds it

has issued. Thus, proper regulatory treatment is to increase the required rate of return on debt by 71 basis points.

**Equity Flotation Costs**

The finance literature discusses several methods of recovering equity flotation costs. Since each method stems from a specific model, (i. e., set of assumptions) of a firm and its cash flows, I will highlight the assumptions that distinguish one method from another.

**Arzac and Marcus**. Arzac and Marcus [2] study the proper flotation cost adjustment formula for a firm that makes continuous use of retained earnings and external equity financing and maintains a constant capital structure (debt/equity ratio). They assume at the outset that underwriting expenses and underpricing apply only to new equity obtained from external sources. They also assume that a firm has previously recovered all underwriting expenses, issuer expenses, and underpricing associated with previous issues of new equity.

To discuss and compare various equity flotation cost adjustment formulas, Arzac and Marcus make use of the following notation:

| | | |
|---|---|---|
| $k$ | | an investors' required return on equity |
| $r$ | = | a utility's allowed return on equity base |
| $S$ | = | value of equity in the absence of flotation costs |
| $S_f$ | | value of equity net of flotation costs |
| $K_t$ | | equity base at time t |
| $E_t$ | | total earnings in year t |
| $D_t$ | = | total cash dividends at time t |

| | | |
|---|---|---|
| b | = | $(E_t\text{-}D_t) \div E_t$ = retention rate, expressed as a fraction of earnings |
| h | = | new equity issues, expressed as a fraction of earnings |
| m | = | equity investment rate, expressed as a fraction of earnings, $m = b + h < 1$ |
| f | = | flotation costs, expressed as a fraction of the value of an issue. |

Because of flotation costs, Arzac and Marcus assume that a firm must issue a greater amount of external equity each year than it actually needs. In terms of the above notation, a firm issues $hE_t \div (1\text{-}f)$ to obtain $hE_t$ in external equity funding. Thus, each year a firm loses:

**Equation 3**

$$L = \frac{hE_t}{1-f} - hE_t = \frac{f}{1-f} \times hE_t$$

due to flotation expenses. The present value, V, of all future flotation expenses is:

**Equation 4**

$$V = \sum_{t=1}^{\infty} \frac{fhE_t}{(1-f)(1+k)^t} = \frac{fh}{1-f} \times \frac{rK_0}{k-mr}$$

To avoid diluting the value of the initial stockholder's equity, a regulatory authority needs to find the value of r, a firm's allowed return on equity base, that equates the value of equity net of flotation costs to the initial equity base ($S_f = K_0$).

Since the value of equity net of flotation costs equals the value of equity in the absence of flotation costs minus the present value of flotation costs, a regulatory authority needs to find that value of *r* that solves the following equation:

$$S_f = S - L.$$

This value is:

**Equation 5**

$$r = \frac{k}{1 - \frac{fh}{1-f}}$$

To illustrate the Arzac-Marcus approach to adjusting the allowed return on equity for the effect of flotation costs, suppose that the cost of equity in the absence of flotation costs is 12 percent. Furthermore, assume that a firm obtains external equity financing each year equal to 10 percent of its earnings and that flotation expenses equal 5 percent of the value of each issue. Then, according to Arzac and Marcus, the allowed return on equity should be:

$$r = \frac{.12}{1 - \frac{(.05).(.1)}{.95}} = .1206 = 12.06\%$$

**Summary**. With respect to the three questions raised at the beginning of this section, it is evident that Arzac and Marcus believe the flotation cost adjustment should be applied each year, since continuous external equity financing is a fundamental assumption of their model. They also believe that the adjusted rate of return should be applied to the entire equity-financed portion of the rate base because their model is based on the assumption that the flotation cost adjustment mechanism will be applied to the entire equity financed portion of the rate base. Finally, Arzac and Marcus recommend a flotation cost adjustment formula, Equation (3), that

implicitly excludes recovery of financing costs associated with financing in previous periods and includes only an allowance for the fraction of equity financing obtained from external sources.

**Patterson**. The Arzac-Marcus flotation cost adjustment formula is significantly different from the conventional approach (found in many introductory textbooks) which recommends the adjustment equation:

**Equation 6**

$$r = \frac{D_t}{P_{t-1}(1-f)} + g$$

where $P_{t-1}$ is the stock price in the previous period and $g$ is the expected dividend growth rate. Patterson [18] compares the Arzac-Marcus adjustment formula to the conventional approach and reaches the conclusion that the Arzac-Marcus formula effectively expenses issuance costs as they are incurred, while the conventional approach effectively amortizes them over an assumed infinite life of the equity issue. Thus, the conventional formula is similar to the formula for the recovery of debt flotation costs: it is not meant to compensate investors for the flotation costs of future issues, but instead is meant to compensate investors for the flotation costs of previous issues. Patterson argues that the conventional approach is more appropriate for rate making purposes because the plant purchased with external equity funds will yield benefits over many future periods.

**Illustration**. To illustrate the Patterson approach to flotation cost recovery, assume that a newly organized utility sells an initial issue of stock for $100 per share, and that the utility plans to finance all new investments with retained earnings. Assume also that: (1) the initial dividend per share is six dollars; (2) the expected long-run dividend growth rate is six percent; (3) the flotation cost is five percent of

the amount of the proceeds; and (4) the payout ratio is 51.28 percent. Then, the investor's required rate of return on equity is [k = (D/P) + g = 6 percent + 6 percent = 12 percent]; and the flotation-cost-adjusted cost of equity is [6 percent (1/.95) + 6 percent = 12.316 percent].

The effects of the Patterson adjustment formula on the utility's rate base, dividends, earnings, and stock price are shown in Table 3. We see that the Patterson formula allows earnings and dividends to grow at the expected six percent rate. We also see that the present value of expected future dividends, $100, is just sufficient to induce investors to part with their money. If the present value of expected future dividends were less than $100, investors would not have been willing to invest $100 in the firm. Furthermore, the present value of future dividends will only equal $100 if the firm is allowed to earn the 12.316 percent flotation-cost-adjusted cost of equity on its entire rate base.

**Summary**. Patterson's opinions on the three issues raised in this section are in stark contrast to those of Arzac and Marcus. He believes that: (1) a flotation cost adjustment should be applied in every year, regardless of whether a firm issues any new equity in each year; (2) a flotation cost adjustment should be applied to the entire equity-financed portion of the rate base, including that portion financed by retained earnings; and (3) the rate of return adjustment formula should allow a firm to recover an appropriate fraction of all previous flotation expenses.

## G. Conclusion

Having reviewed the literature and analyzed flotation cost issues, I conclude that:

**Definition of Flotation Cost**: A regulated firm should be allowed to recover both the total underwriting and issuance expenses associated with issuing securities and the cost of market pressure.

**Time Pattern of Flotation Cost Recovery**. Shareholders are indifferent between the alternatives of immediate recovery of flotation costs and recovery over time, as long as they are fairly compensated for the opportunity cost of their money. This opportunity cost must include both the time value of money and a risk premium for equity investments of this nature.

**Regulatory Recovery of Flotation Costs**. The Patterson approach to recovering flotation costs is the only rate-of-return-adjustment approach that meets the *Hope* case criterion that a regulated company's revenues must be sufficient to allow the company an opportunity to recover all prudently incurred expenses, including the cost of capital. The Patterson approach is also the only rate-of-return-adjustment approach that provides an incentive for investors to invest in the regulated company.

**Implementation of a Flotation Cost Adjustment**. As noted earlier, prevailing regulatory practice seems to be to allow the recovery of flotation costs through an adjustment to the required rate of return. My review of the literature on this subject indicates that there are at least two recommended methods of making this adjustment: the Patterson approach and the Arzac-Marcus approach. The Patterson approach assumes that a firm's flotation expenses on new equity issues are treated in the same manner as flotation expenses on new bond issues, i. e., they are amortized over future time periods. If this assumption is true (and I believe it is), then the flotation cost adjustment should be applied to a firm's entire equity base, including retained earnings. In practical terms, the Patterson approach produces an increase in a firm's cost of equity of approximately thirty basis points. The Arzac-Marcus approach assumes that flotation costs on new equity issues are recovered entirely in the year in which the securities are sold. Under the Arzac-Marcus assumption, a firm should not be allowed any adjustments for flotation costs associated with previous flotations. Instead, a firm should be allowed only an adjustment on future security sales as they

occur. Under reasonable assumptions about the rate of new equity sales, this method produces an increase in the cost of equity of approximately six basis points. Since the Arzac-Marcus approach does not allow the company to recover the entire amount of its flotation cost, I recommend that this approach be rejected and the Patterson approach be accepted.

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**Table 1**
Direct Costs as a Percentage of Gross Proceeds
for Equity (IPOs and SEOs) and Straight and Convertible Bonds
Offered by Domestic Operating Companies 1990—1994[6]

**Equities**

| | | IPOs | | | | SEOs | | | |
|---|---|---|---|---|---|---|---|---|---|
| Line No. | Proceeds ($ in millions) | No. of Issues | Gross Spreads | Other Direct Expenses | Total Direct Costs | No. of Issues | Gross Spreads | Other Direct Expenses | Total Direct Costs |
| 1 | 2-9.99 | 337 | 9.05% | 7.91% | 16.96% | 167 | 7.72% | 5.56% | 13.28% |
| 2 | 10-19.99 | 389 | 7.24% | 4.39% | 11.63% | 310 | 6.23% | 2.49% | 8.72% |
| 3 | 20-39.99 | 533 | 7.01% | 2.69% | 9.70% | 425 | 5.60% | 1.33% | 6.93% |
| 4 | 40-59.99 | 215 | 6.96% | 1.76% | 8.72% | 261 | 5.05% | 0.82% | 5.87% |
| 5 | 60-79.99 | 79 | 6.74% | 1.46% | 8.20% | 143 | 4.57% | 0.61% | 5.18% |
| 6 | 80-99.99 | 51 | 6.47% | 1.44% | 7.91% | 71 | 4.25% | 0.48% | 4.73% |
| 7 | 100-199.99 | 106 | 6.03% | 1.03% | 7.06% | 152 | 3.85% | 0.37% | 4.22% |
| 8 | 200-499.99 | 47 | 5.67% | 0.86% | 6.53% | 55 | 3.26% | 0.21% | 3.47% |
| 9 | 500 and up | 10 | 5.21% | 0.51% | 5.72% | 9 | 3.03% | 0.12% | 3.15% |
| 10 | **Total/Average** | **1,767** | **7.31%** | **3.69%** | **11.00%** | **1,593** | **5.44%** | **1.67%** | **7.11%** |

[6] Inmoo Lee, Scott Lochhead, Jay Ritter, and Quanshui Zhao, "The Costs of Raising Capital," *Journal of Financial Research* Vol 19 No 1 (Spring 1996) pp. 59-74.

**Bonds**

| | | Convertible Bonds | | | | Straight Bonds | | | |
|---|---|---|---|---|---|---|---|---|---|
| Line No. | Proceeds ($ in millions) | No. of Issues | Gross Spreads | Other Direct Expenses | Total Direct Costs | No. of Issues | Gross Spreads | Other Direct Expenses | Total Direct Costs |
| 1 | 2-9.99 | 4 | 6.07% | 2.68% | 8.75% | 32 | 2.07% | 2.32% | 4.39% |
| 2 | 10-19.99 | 14 | 5.48% | 3.18% | 8.66% | 78 | 1.36% | 1.40% | 2.76% |
| 3 | 20-39.99 | 18 | 4.16% | 1.95% | 6.11% | 89 | 1.54% | 0.88% | 2.42% |
| 4 | 40-59.99 | 28 | 3.26% | 1.04% | 4.30% | 90 | 0.72% | 0.60% | 1.32% |
| 5 | 60-79.99 | 47 | 2.64% | 0.59% | 3.23% | 92 | 1.76% | 0.58% | 2.34% |
| 6 | 80-99.99 | 13 | 2.43% | 0.61% | 3.04% | 112 | 1.55% | 0.61% | 2.16% |
| 7 | 100-199.99 | 57 | 2.34% | 0.42% | 2.76% | 409 | 1.77% | 0.54% | 2.31% |
| 8 | 200-499.99 | 27 | 1.99% | 0.19% | 2.18% | 170 | 1.79% | 0.40% | 2.19% |
| 9 | 500 and up | 3 | 2.00% | 0.09% | 2.09% | 20 | 1.39% | 0.25% | 1.64% |
| 10 | **Total/Average** | **211** | **2.92%** | **0.87%** | **3.79%** | **1,092** | **1.62%** | **0.62%** | **2.24%** |

Notes:

Closed-end funds and unit offerings are excluded from the sample. Rights offerings for SEOs are also excluded. Bond offerings do not include securities backed by mortgages and issues by Federal agencies. Only firm commitment offerings and non-shelf-registered offerings are included.
Gross Spreads as a percentage of total proceeds, including management fee, underwriting fee, and selling concession.
Other Direct Expenses as a percentage of total proceeds, including management fee, underwriting fee, and selling concession.
Total Direct Costs as a percentage of total proceeds (total direct costs are the sum of gross spreads and other direct expenses).

**Table 2**
Direct Costs of Raising Capital 1990—1994
Utility versus Non-Utility Companies[7]

**Equities**

| | **Non-Utilities** | IPOs | | | SEOs | | |
|---|---|---|---|---|---|---|---|
| Line No. | Proceeds ($ in millions) | No. of Issues | Gross Spreads | Total Direct Costs | No. Of Issues | Gross Spreads | Total Direct Costs |
| 1 | 2-9.99 | 332 | 9.04% | 16.97% | 154 | 7.91% | 13.76% |
| 2 | 10-19.99 | 388 | 7.24% | 11.64% | 278 | 6.42% | 9.01% |
| 3 | 20-39.99 | 528 | 7.01% | 9.70% | 399 | 5.70% | 7.07% |
| 4 | 40-59.99 | 214 | 6.96% | 8.71% | 240 | 5.17% | 6.02% |
| 5 | 60-79.99 | 78 | 6.74% | 8.21% | 131 | 4.68% | 5.31% |
| 6 | 80-99.99 | 47 | 6.46% | 7.88% | 60 | 4.35% | 4.84% |
| 7 | 100-199.99 | 101 | 6.01% | 7.01% | 137 | 3.97% | 4.36% |
| 8 | 200-499.99 | 44 | 5.65% | 6.49% | 50 | 3.27% | 3.48% |
| 9 | 500 and up | 10 | 5.21% | 5.72% | 8 | 3.12% | 3.25% |
| 10 | **Total/Average** | 1,742 | 7.31% | 11.01% | 1,457 | 5.57% | 7.32% |
| | | | | | | | |
| 11 | **Utilities Only** | | | | | | |
| 12 | 2-9.99 | 5 | 9.40% | 16.54% | 13 | 5.41% | 7.68% |
| 13 | 10-19.99 | 1 | 7.00% | 8.77% | 32 | 4.59% | 6.21% |
| 14 | 20-39.99 | 5 | 7.00% | 9.86% | 26 | 4.17% | 4.96% |
| 15 | 40-59.99 | 1 | 6.98% | 11.55% | 21 | 3.69% | 4.12% |
| 16 | 60-79.99 | 1 | 6.50% | 7.55% | 12 | 3.39% | 3.72% |
| 17 | 80-99.99 | 4 | 6.57% | 8.24% | 11 | 3.68% | 4.11% |
| 18 | 100-199.99 | 5 | 6.45% | 7.96% | 15 | 2.83% | 2.98% |
| 19 | 200-499.99 | 3 | 5.88% | 7.00% | 5 | 3.19% | 3.48% |
| 20 | 500 and up | 0 | | | 1 | 2.25% | 2.31% |
| 21 | **Total/Average** | 25 | 7.15% | 10.14% | 136 | 4.01% | 4.92% |

[7] Lee *et al, op. cit.*

Table 2 (continued)
Direct Costs of Raising Capital 1990—1994
Utility versus Non-Utility Companies[8]

**Bonds**

| | **Non- Utilities** | Convertible Bonds | | | Straight Bonds | | |
|---|---|---|---|---|---|---|---|
| Line No. | Proceeds ($ in millions) | No. of Issues | Gross Spreads | Total Direct Costs | No. of Issues | Gross Spreads | Total Direct Costs |
| 1 | 2-9.99 | 4 | 6.07% | 8.75% | 29 | 2.07% | 4.53% |
| 2 | 10-19.99 | 12 | 5.54% | 8.65% | 47 | 1.70% | 3.28% |
| 3 | 20-39.99 | 16 | 4.20% | 6.23% | 63 | 1.59% | 2.52% |
| 4 | 40-59.99 | 28 | 3.26% | 4.30% | 76 | 0.73% | 1.37% |
| 5 | 60-79.99 | 47 | 2.64% | 3.23% | 84 | 1.84% | 2.44% |
| 6 | 80-99.99 | 12 | 2.54% | 3.19% | 104 | 1.61% | 2.25% |
| 7 | 100-199.99 | 55 | 2.34% | 2.77% | 381 | 1.83% | 2.38% |
| 8 | 200-499.99 | 26 | 1.97% | 2.16% | 154 | 1.87% | 2.27% |
| 9 | 500 and up | 3 | 2.00% | 2.09% | 19 | 1.28% | 1.53% |
| 10 | **Total/Average** | 203 | 2.90% | 3.75% | 957 | 1.70% | 2.34% |
| | | | | | | | |
| 11 | **Utilities Only** | | | | | | |
| 12 | 2-9.99 | 0 | | | 3 | 2.00% | 3.28% |
| 13 | 10-19.99 | 2 | 5.13% | 8.72% | 31 | 0.86% | 1.35% |
| 14 | 20-39.99 | 2 | 3.88% | 5.18% | 26 | 1.40% | 2.06% |
| 15 | 40-59.99 | 0 | | | 14 | 0.63% | 1.10% |
| 16 | 60-79.99 | 0 | | | 8 | 0.87% | 1.13% |
| 17 | 80-99.99 | 1 | 1.13% | 1.34% | 8 | 0.71% | 0.98% |
| 18 | 100-199.99 | 2 | 2.50% | 2.74% | 28 | 1.06% | 1.42% |
| 19 | 200-499.99 | 1 | 2.50% | 2.65% | 16 | 1.00% | 1.40% |
| 20 | 500 and up | 0 | | | 1 | 3.50% | na[9] |
| 21 | **Total/Average** | 8 | 3.33% | 4.66% | 135 | 1.04% | 1.47% |

[8] Lee *et al, op. cit.*

[9] Not available because of missing data on other direct expenses.

Notes:
Total proceeds raised in the United States, excluding proceeds from the exercise of over allotment options.
Gross spreads as a percentage of total proceeds (including management fee, underwriting fee, and selling concession).
Other direct expenses as a percentage of total proceeds (including registration fee and printing, legal, and auditing costs).

**Table 3**
Illustration of Patterson Approach to Flotation Cost Recovery

| Line No. | Time Period | Rate Base | Earnings @ 12.32% | Earnings @ 12.00% | Dividends | Amortization Initial FC |
|---|---|---|---|---|---|---|
| 1 | 0 | 95.00 | | | | |
| 2 | 1 | 100.70 | 11.70 | 11.40 | 6.00 | 0.3000 |
| 3 | 2 | 106.74 | 12.40 | 12.08 | 6.36 | 0.3180 |
| 4 | 3 | 113.15 | 13.15 | 12.81 | 6.74 | 0.3371 |
| 5 | 4 | 119.94 | 13.93 | 13.58 | 7.15 | 0.3573 |
| 6 | 5 | 127.13 | 14.77 | 14.39 | 7.57 | 0.3787 |
| 7 | 6 | 134.76 | 15.66 | 15.26 | 8.03 | 0.4015 |
| 8 | 7 | 142.84 | 16.60 | 16.17 | 8.51 | 0.4256 |
| 9 | 8 | 151.42 | 17.59 | 17.14 | 9.02 | 0.4511 |
| 10 | 9 | 160.50 | 18.65 | 18.17 | 9.56 | 0.4782 |
| 11 | 10 | 170.13 | 19.77 | 19.26 | 10.14 | 0.5068 |
| 12 | 11 | 180.34 | 20.95 | 20.42 | 10.75 | 0.5373 |
| 13 | 12 | 191.16 | 22.21 | 21.64 | 11.39 | 0.5695 |
| 14 | 13 | 202.63 | 23.54 | 22.94 | 12.07 | 0.6037 |
| 15 | 14 | 214.79 | 24.96 | 24.32 | 12.80 | 0.6399 |
| 16 | 15 | 227.67 | 26.45 | 25.77 | 13.57 | 0.6783 |
| 17 | 16 | 241.33 | 28.04 | 27.32 | 14.38 | 0.7190 |
| 18 | 17 | 255.81 | 29.72 | 28.96 | 15.24 | 0.7621 |
| 19 | 18 | 271.16 | 31.51 | 30.70 | 16.16 | 0.8078 |
| 20 | 19 | 287.43 | 33.40 | 32.54 | 17.13 | 0.8563 |
| 21 | 20 | 304.68 | 35.40 | 34.49 | 18.15 | 0.9077 |
| 22 | 21 | 322.96 | 37.52 | 36.56 | 19.24 | 0.9621 |
| 23 | 22 | 342.34 | 39.77 | 38.76 | 20.40 | 1.0199 |
| 24 | 23 | 362.88 | 42.16 | 41.08 | 21.62 | 1.0811 |
| 25 | 24 | 384.65 | 44.69 | 43.55 | 22.92 | 1.1459 |
| 26 | 25 | 407.73 | 47.37 | 46.16 | 24.29 | 1.2147 |
| 27 | 26 | 432.19 | 50.21 | 48.93 | 25.75 | 1.2876 |
| 28 | 27 | 458.12 | 53.23 | 51.86 | 27.30 | 1.3648 |
| 29 | 28 | 485.61 | 56.42 | 54.97 | 28.93 | 1.4467 |
| 30 | 29 | 514.75 | 59.81 | 58.27 | 30.67 | 1.5335 |
| 31 | 30 | 545.63 | 63.40 | **61.77** | **32.51** | 1.6255 |
| 32 | Present Value@12% | | 195.00 | 190.00 | 100.00 | 5.00 |

**PROGRESS ENERGY FLORIDA**
**APPENDIX 3**
**EX ANTE RISK PREMIUM METHOD**

My ex ante risk premium method is based on studies of the DCF expected return on proxy companies compared to the interest rate on Moody's A-rated utility bonds. Specifically, for each month in my study period, I calculate the risk premium using the equation,

$$RP_{PROXY} = DCF_{PROXY} - I_A$$

where:

$RP_{PROXY}$ = the required risk premium on an equity investment in the proxy group of companies,

$DCF_{PROXY}$ = average DCF estimated cost of equity on a portfolio of proxy companies; and

$I_A$ = the yield to maturity on an investment in A-rated utility bonds.

**Electric Company Ex Ante Risk Premium Analysis**. For my ex ante risk premium electric proxy group DCF analysis, I began with the Moody's group of 24 electric companies shown in Table 1. I used the Moody's group of electric companies because they are a widely followed group of electric utilities, and use of this constant group greatly simplified the data collection task required to estimate the ex ante risk premium over the months of my study. Simplifying the data collection task was desirable because the ex ante risk premium approach requires that the DCF model be estimated for every company in every month of the study period. The Ex Ante Risk Premium Schedule in my direct testimony displays the average DCF estimated cost of equity on an investment in the portfolio of electric companies and the yield to maturity on A-rated utility bonds in each month of the study.

Previous studies have shown that the ex ante risk premium tends to vary inversely with the level of interest rates, that is, the risk premium tends to increase when interest rates decline, and decrease when interest rates go up. To test whether

my studies also indicate that the ex ante risk premium varies inversely with the level of interest rates, I performed a regression analysis of the relationship between the ex ante risk premium and the yield to maturity on A-rated utility bonds, using the equation,

$$RP_{PROXY} = a + (b \times I_A) + e$$

where:

$RP_{PROXY}$ = risk premium on proxy company group;

$I_A$ = yield to maturity on A-rated utility bonds;

e = a random residual; and

a, b = coefficients estimated by the regression procedure.

Regression analysis assumes that the statistical residuals from the regression equation are random. My examination of the residuals revealed that there is a significant probability that the residuals are serially correlated (non-zero serial correlation indicates that the residual in one time period tends to be correlated with the residual in the previous time period). Therefore, I made adjustments to my data to correct for the possibility of serial correlation in the residuals.

The common procedure for dealing with serial correlation in the residuals is to estimate the regression coefficients in two steps. First, a multiple regression analysis is used to estimate the serial correlation coefficient, *r*. Second, the estimated serial correlation coefficient is used to transform the original variables into new variables whose serial correlation is approximately zero. The regression coefficients are then re-estimated using the transformed variables as inputs in the regression equation. Based on my knowledge of the statistical relationship between the yield to maturity on A-rated utility bonds and the required risk premium, my estimate of the ex ante risk premium on an investment in my proxy electric company group as compared to an investment in A-rated utility bonds is given by the equation:

$$RP_{PROXY} = 6.52 - .308 \times I_A.$$

Using the 2006 forecasted 6.94 percent yield to maturity on A-rated utility bonds available from Blue Chip as of March 2005, the regression equation produces an ex ante risk premium cost of equity based on the electric proxy group equal to 4.38 percent (6.52 – .308 x 6.94 = 4.38).

To estimate the cost of equity using the ex ante risk premium method, one may add the estimated risk premium over the yield on A-rated utility bonds to the yield to maturity on A-rated utility bonds. The Blue Chip forecasted yield on A-rated utility bonds in 2006 is 6.94 percent. As noted above, my analyses produce an estimated risk premium over the yield on A-rated utility bonds equal to 4.38 percent. Adding an estimated risk premium of 4.38 percent to the 6.94 percent average yield to maturity on A-rated utility bonds produces a cost of equity estimate of 11.3 percent for the electric company proxy group using the ex ante risk premium method.

**Natural Gas Company Ex Ante Risk Premium Analysis**. My second ex ante risk premium study was applied to a natural gas proxy group and followed the procedures described above. To select my ex ante risk premium natural gas proxy group of companies, I used the same criteria that I use when estimating the DCF cost of equity, namely, I selected all the companies in Value Line's groups of natural gas companies that: (1) paid dividends during every quarter of the last two years; (2) did not decrease dividends during any quarter of the past two years; (3) had at least three analysts included in the I/B/E/S mean growth forecast; (4) have an investment grade bond rating and a Value Line Safety Rank of 1, 2, or 3; and (5) have not announced a merger. The Natural Gas Company Ex Ante Risk Premium Exhibit in my direct testimony displays the results of my ex ante risk premium study, showing the average DCF estimated cost of equity on an investment in the portfolio of natural gas companies and the yield to maturity on A-rated utility bonds in each month. [10]



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[10] My two ex ante risk premium studies cover slightly different time periods, with the natural gas company risk premium study extending over a longer period of time, because I began doing an ex ante study using natural gas companies before I began performing a similar study for the electric companies.

Based on my knowledge of the statistical relationship between the yield to maturity on A-rated utility bonds and the required risk premium, my estimate of the ex ante risk premium on an investment in my proxy natural gas companies as compared to an investment in A-rated utility bonds is given by the equation:

$$RP_{PROXY} = 6.58 - .272 \times I_A.$$

Using the 6.94 percent forecasted yield to maturity on A-rated utility bonds for 2006, the regression equation produces an ex ante risk premium for the natural gas company proxy group equal to 4.69 percent (6.58 – .272 x 6.94 = 4.69).

To estimate the cost of equity using the ex ante risk premium method, one may add the estimated risk premium over the yield on A-rated utility bonds to the yield to maturity on A-rated utility bonds. As noted above, the Blue Chip forecasted yield on A-rated utility bonds in 2006 is 6.94 percent. As noted above, my analyses produce an estimated risk premium over the yield on A-rated utility bonds equal to 4.69 percent. Adding an estimated risk premium of 4.69 percent to the 6.94 percent average yield to maturity on A-rated utility bonds produces a cost of equity estimate of 11.6 percent for the natural gas proxy group using the ex ante risk premium method.

# TABLE 1
# MOODY'S ELECTRIC COMPANIES

American Electric Power
Constellation Energy
Progress Energy
CH Energy Group
Cinergy Corp.
Consolidated Edison Inc.
DPL Inc.
DTE Energy Co.
Dominion Resources Inc.
Duke Energy Corp.
Energy East Corp.
FirstEnergy Corp.
Reliant Energy Inc.
IDACORP. Inc.
IPALCO Enterprises Inc.
NiSource Inc.
OGE Energy Corp.
Exelon Corp.
PPL Corp.
Potomac Electric Power Co.
Public Service Enterprise Group
Southern Company
Teco Energy Inc.
Xcel Energy Inc.

Source of data: Mergent Public Utility Manual, August 2002. Of these 24 companies, I eliminated five companies from my ex ante risk premium DCF analysis because there was insufficient data to perform a DCF analysis for most of my study period. Specifically, Exelon did not pay a dividend in most months of my ex ante risk premium study; Potomac Electric Power had merged with Connectiv and it was not possible to have a consistent dividend and stock price over the study period; IPALCO merged with a company that is not in the electric utility industry; Reliant divested its electric utility operations; and CH Energy does not have any I/B/E/S analysts' estimates of long-term growth.

**PROGRESS ENERGY FLORIDA**
**APPENDIX 4**
**EX POST RISK PREMIUM METHOD**

**Source**

Stock price and yield information is obtained from Standard & Poor's Security Price publication. Standard & Poor's derives the stock dividend yield by dividing the aggregate cash dividends (based on the latest known annual rate) by the aggregate market value of the stocks in the group. The bond price information is obtained by calculating the present value of a bond due in 30 years with a $4.00 coupon and a yield to maturity of a particular year's indicated Moody's A-rated Utility bond yield. The values shown on the Ex Post Risk Premium Exhibits are the January values of the respective indices.

**Calculation of Stock and Bond Returns**

Sample calculation of "Stock Return" column:

$$\text{Stock Return (2003)} = \left[\frac{\text{Stock Price (2004)} - \text{Stock Price (2003)} + \text{Dividend (2003)}}{\text{Stock Price (2003)}}\right]$$

where Dividend (2003) = Stock Price (2003) x Stock Div. Yield (2003)

Sample calculation of "Bond Return" column:

$$\text{Bond Return (2003)} = \left[\frac{\text{Bond Price (2003)} - \text{Bond Price (2003)} + \text{Interest (2003)}}{\text{Bond Price (2003)}}\right]$$

where Interest = $4.00